

ELP and ELECTRIC LIGHT and POWER

JANUARY 1, 1960

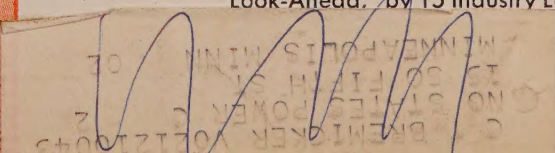
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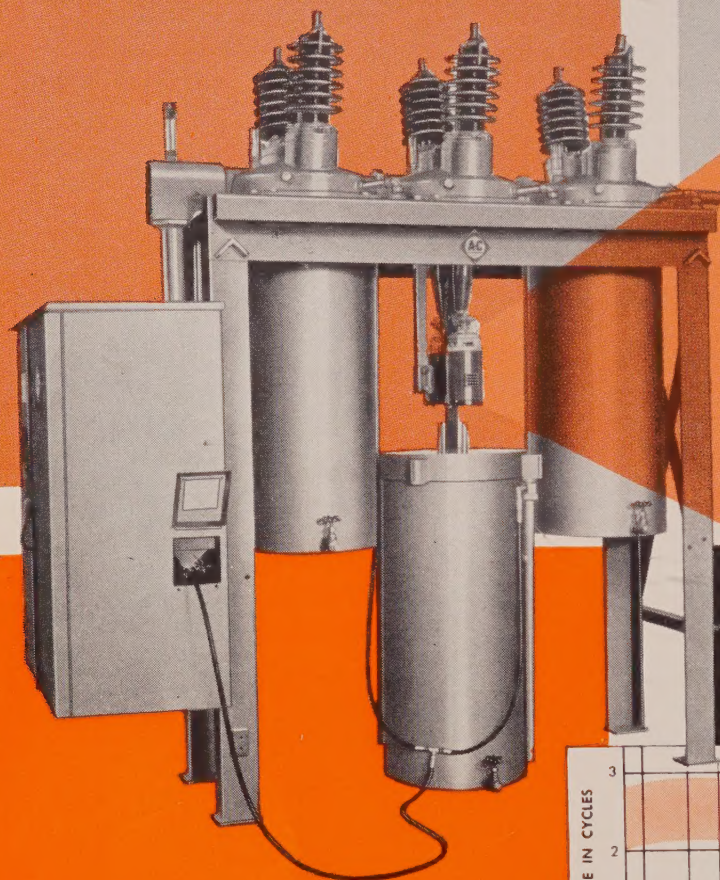
ELECTRIC UTILITIES IN 1960:

101 Ways to Improve
Plans, Management,
Performance—

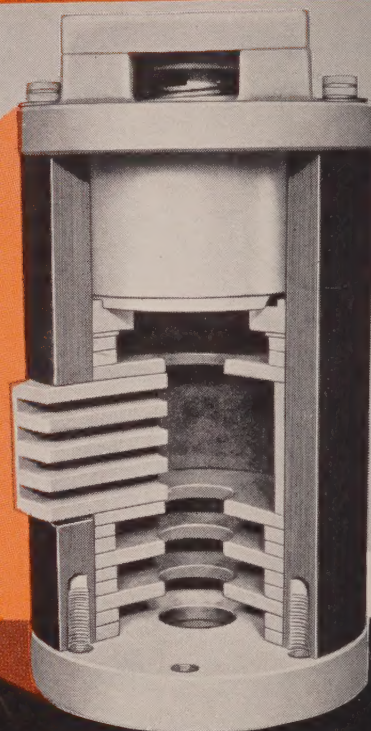
See Pages 33-44 for EL&P's Annual
"Look-Ahead," by 15 Industry Leaders



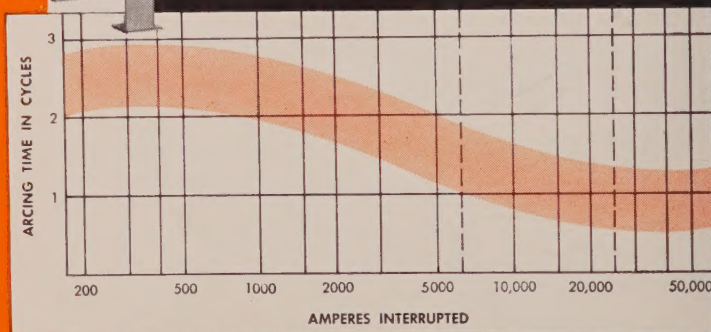
ALLIS-CHALMERS...Pacing Power Progress



Ratings: 23 kv to 46 kv, 500,000
through 1,500,000 kva.



Cross-blast principle of new LC
interrupter cuts arcing time.



Graph shows short arcing times.

industry's **newest** interrupter

Here's new high-speed interrupting efficiency for Allis-Chalmers frame-mounted circuit breakers. New LC interrupter cuts arcing time. There's greater system protection, less oil contamination. Dielectric strength is extended, maintenance lowered.

More A-C breaker bonus benefits! You get mechanically trip-free operation. Highly successful *Pneu-Draulic* operator provides fast operation — ends moisture, rust, freezing. Hydraulic power-operated tank lifter cuts raising and lowering time by 80%.

For all the facts on these frame-mounted breakers, call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.



ALLIS-CHALMERS

Pneu-Draulic is an
Allis-Chalmers trademark.

NEWS IN PERSPECTIVE

MANAGEMENT VIEW

"BEST DEFENSE" type offense of the investor-owned electric utilities puts the nation on notice once again--through EEI'S year-end review--that the U.S. power picture compares most favorably with not only anything the Russians have, but anything they aspire to . . . and, that such world leadership in electric power was achieved through the industry's growth in an atmosphere of free enterprise. The warning is sharp: "If we . . . were to adopt philosophies and practices of government control typical of the Russian system, we would destroy the characteristics of freedom and initiative which brought us world leadership and enable us to keep it." (See page 24.)

A DISTINCT CHANGE in the political picture over the past 10 years has been achieved in South Carolina with "an uphill fight," S. C. McMeekin, president of So. Carolina Electric & Gas Co., told a company-progress report session recently. "Now, we are enjoying the confidence and wonderful cooperation of state, county and local officials . . . but, these things do not just happen--we have to work and work hard to get them," said Mr. McMeekin.

THE EARNINGS INCREASE (10-percent) for investor-owned electric utilities has outdistanced the industry's rate of increase in electric plant investment (eight-percent), notes Michael J. Kraemer in Commonwealth Services' "Perspective." This occurrence, in the year ending July 31, 1959, marking a slowly but steadily climbing rate of return on investment, "again demonstrates the industry's ability to vigorously respond to improvement in general economic conditions."

"GOOD FROM UP HERE" might well be the view investment analysts get of the Po-

tomac Edison Co.'s service area. West Penn Electric System has taken representatives of leading financial companies on a series of day-long aerial tours.

BEST RESEARCH PROGRAM in the electric industry, from the standpoint of scope and depth, is proudly claimed by Philip Sporn for the American Electric Power System. Reporting to his organization's management personnel in a state-of-the-company address, he said: "There never has been a time in the history of the company when as much activity in solid research was being carried on throughout the AEP System as today and no year in which we did as much effective work as we did in 1959."

LABOR TURNOVER REDUCTION cannot be blue-printed, concluded a new AMA research study, authored by Dr. F. J. Gaudet. Techniques reported as successful in one company, says Dr. Gaudet, almost invariably will be reported as failures in another company. Hardest part of attacking the labor turnover problem: "finding out why employees leave." A relatively new technique described in the report is a "post-terminal interview," recording reasons for leaving.

ECONOMIC CLIMATE

CONTINUING VIGOR, as the year starts, characterizes the economy. With shortages becoming less oppressive, industrial output appears to be rising rapidly. The utility industry and its suppliers are participating in the general economic growth. Here's how the government analyzes the prospects for some utility-related industries this year:

ELECTRICAL EQUIPMENT industry--which last year moved up eight percent above 1958--will continue to grow. The 2,500

NEWS IN PERSPECTIVE

makers of transmission and distribution equipment, motors and control apparatus, lighting equipment, and electrical construction materials will enjoy an increase in sales of about five percent from 1959 volume of more than \$7.5-billion. Expansion of this industry is expected to be faster than that of the Nation's economy as a whole. Installation by electric utilities of some 14-million kw in 1959 will create a market for about 70-million kva of transformers, \$450-million worth of switchgear and related equipment, and millions of dollars worth of pole line hardware and construction materials.

TRANSMISSION AND DISTRIBUTION equipment industry is expected to boost 1960 deliveries three percent over 1959. An increase in the ratio of installed transformers to capacity of installed generating equipment is quite likely. At present, estimates are that 5.31 kva of transformers are needed for each kw of generating capacity. By the end of the year, this may rise to 5.37 kva. About \$965 million worth of transmission and distribution equipment is expected to be produced and shipped in 1960.

ELECTRICAL CONSTRUCTION MATERIAL industry will boost sales 3½-percent over 1959, if materials are available.

WASHINGTON INFLUENCE

AS CONGRESS MEETS, a number of proposals made last year continue to hang over the electric utility industry. Here are some of the items that the lawmakers will have before them again:

Burns Creek authorization, already passed by the Senate and included for nearly \$500,000 in the 1959 Public Works bill. It is pending before the House Interior Committee.

Bonneville Power Corp. bill, which has had hearings in the Senate Public Works Committee, but no floor action.

Susquehanna River watershed bill--to create a TVA-type of watershed Commission for the area. The commission would be charged with unified area and regional planning, including development of hydro power.

Coordinated development bills (two in the House, one in the Senate) to apply to hydro projects. They would permit a new basis for payments for benefits. No floor action has been taken, but both House and Senate Commerce Committees have held hearings.

Water project evaluation standards would be modified--and weakened--if H.R. were enacted. More hearings are indicated before floor action is likely.

Proposals to make transmission lines common carriers and to force utilities to use excess line capacity to carry federal power if they have rights-of-way on public lands are far from dead.

Electric power supply survey, to be made by the Senate Interior Committee, may well come up for action fairly early in the session.

Other measures include proposed changes in REA financing methods (higher interest rates and use of a revolving fund); creation of a Missouri Valley Authority; new rules for tax deductibility for lobbying and advertising costs; and Columbia River development.

INDUSTRY SIFTINGS

AN ORDER GAIN OF 13-PERCENT for the electrical industry in 1960 is predicted by the Westinghouse market planning director, Wm. H. Morris. Consumer product sales should rise by about seven-percent over 1959, he estimates, but "a mild decline" may come in 1961." And, says Mr. Morris, the overall industry order situation "will do well" if the '60 gains are held into 1961. (Norge President Judson S. Sayre looks for a 10-percent rise in appliance sales in '60.)

PRICES--UP OR DOWN?--The survey committee of the National Association of Purchasing Agents says keen competition has resulted in price reductions in the electrical equipment industry. Example: GE's five-percent cut on power transformers rated 12,000 kva and up. But, on the other hand, Westinghouse and Allis-Chalmers have boosted prices on power transformers from 10 to 15 percent. For more on current marketplace action, see page 58.

NEWS IN PERSPECTIVE

WORK-INJURY RATE of electric utilities held steady in 1958, the Labor Department reports. 5.5 disabling injuries occurred per million man-hours worked. Average number of days of disability resulting from such injuries (for each million employee-hours worked) was 1,238, with the average period of disability in each case being 226 days. Death resulted from 2.4-percent of the injuries, permanent impairment in 7.1-percent, and temporary total disability in 90.5-percent.

NO U-235 PRICE SUBSIDY was found by a special Atomic Industrial Forum Committee permitted to look at the AEC's "classified" data on uranium ore processing costs (as predicted by persons familiar with the Commission's records)--(see EL&P Dec. 15, p. 54). Following up on an invitation from AEC Chairman McCone, the AIF committee (K. D. Nichols, P. F. Brundage and Wm. Webster) also reached possibly more significant conclusions that: (a) "prices charged are also capable of future reduction," and (b) "enriched U-235 can be supplied in quantities sufficient to meet the most optimistic future estimates of requirements for the generation of power and for other uses." (See EL&P, p. 30.)

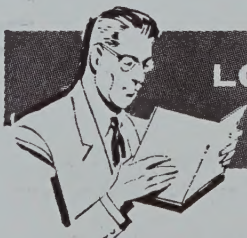
PG&E'S "EUREKA" ATOMIC PLANT moved a step closer in mid-December, when the California utilities commission issued a certificate of public convenience and necessity covering construction of the proposed project at Humboldt Bay. (PG&E now awaits a decision from the AEC on its application for a construction permit.)

OVERHEAD UTILITY LINES--"unsightly" downtown--may continue to "mar the appearance" of Jacksonville Beach, Florida, city officials have had to agree. Although a Downtown Council has recommended burying the lines, City Manager Wingate finds this economically unfeasible . . . especially in this oceanside location where the high water table would require concrete vaults and pumps to keep the lines dry. An alternative: continuing the practice already underway of relocating overhead lines in the alleys downtown, away from salt spray sufficiently to add from three to five

years of life to the equipment. (But, one problem with this solution is getting merchants to agree to change the point of service to their buildings.)

TRANSFORMER ROOM EXPLOSION at a Con-Edison powerhouse, reported in early press accounts as coming from the new 2500-kva auxiliary transformer, actually involved an unenergized unit. The New York utility clarified the report this way: "Two men employed by a contractor, working on the installation of a new boiler, were at work on an interlock control associated with the transformer for supplying power to four boiler fans. A short circuit at or near the switch resulted in an explosion blowing off the switch compartment doors outside of which the men were working. Apparently the insulating oil in the oil switch vaporized from the explosion and the toxic vapor 'drowned' the men, who had been knocked to the ground."

"POWER PARADE" of Federal Pacific Electric Co. is taking an exhibit of the suppliers electric control, distribution and power equipment to more than 30 cities across the U.S. in an 8-month tour.



LOOKING AHEAD... FINANCIALLY

--From Irving Trust

Scheduling was very thin for January with only a few offerings scheduled for the first quarter of 1960. (The next issue of "Looking Ahead" will include construction and financing total estimates for the year 1960, in addition to completed figures for 1959.)

Financing scheduled for the first three months of 1960 includes:

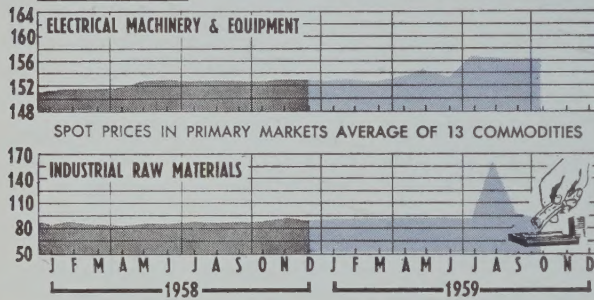
Electric--bonds: 234-million, preferred: \$12-million, common: about \$18-million; total, \$264-million. Largest issues are Duke Power and Southern California Edison with \$50-million bonds each.

Gas--bonds: \$11-million and preferred: \$30 to 35-million--total, \$41 to 46-million. Telephone--bonds: \$111.5-million and common: \$143.6-million--total, \$255-million.

MARKETING GUIDEPOSTS

INDEX OF PRICES

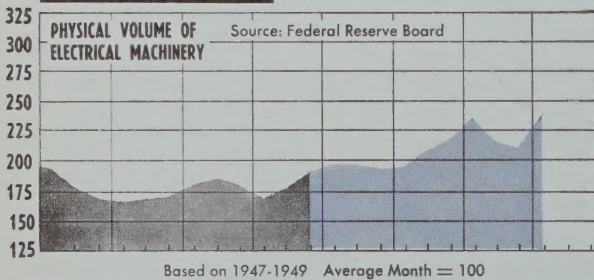
Source: U. S. Dept. of Labor (1947-1949 = 100)



ELECTRICAL MANUFACTURING

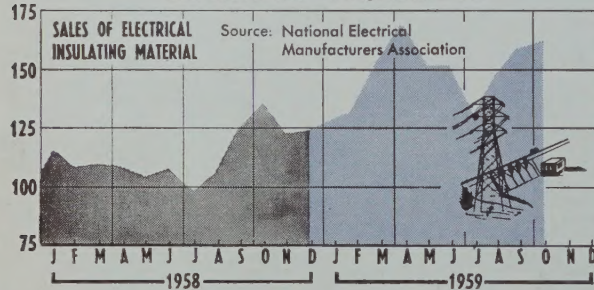
PHYSICAL VOLUME OF ELECTRICAL MACHINERY

Source: Federal Reserve Board



SALES OF ELECTRICAL INSULATING MATERIAL

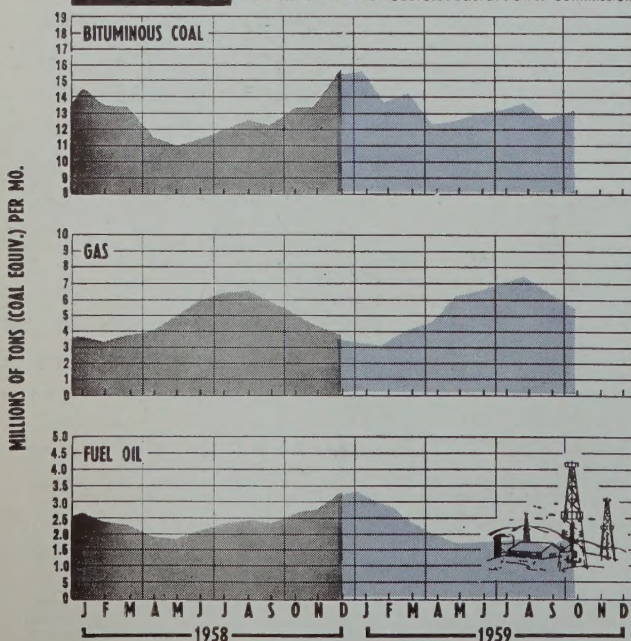
Source: National Electrical Manufacturers Association



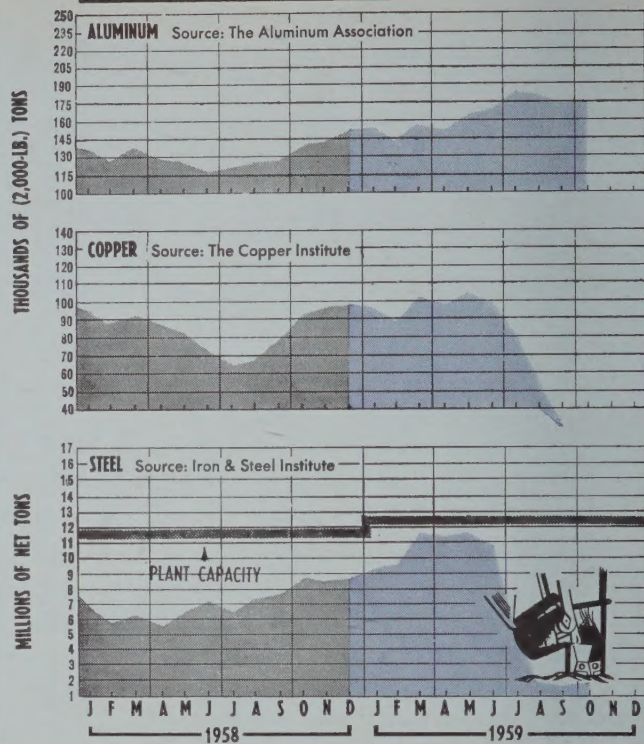
FUEL CONSUMPTION

ELECTRIC UTILITIES

Source: Federal Power Commission

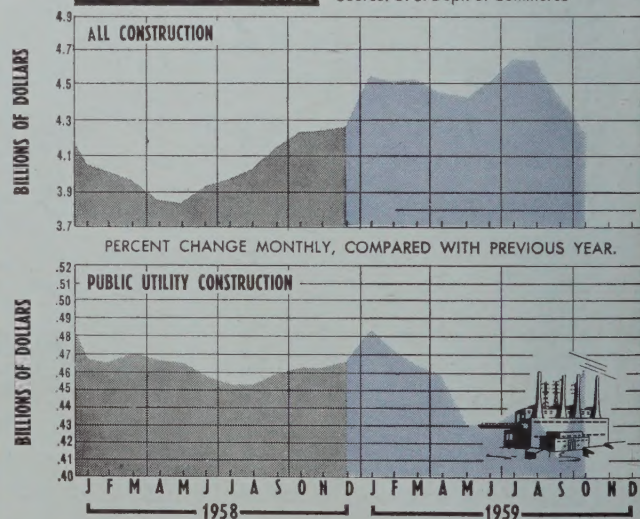


U. S. PRODUCTION OF PRIMARY METALS



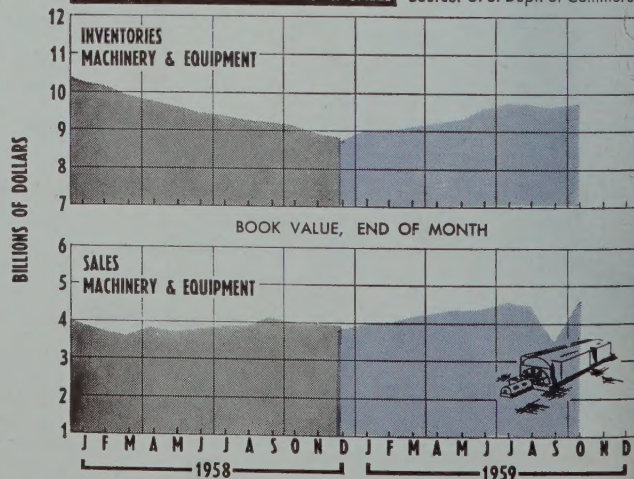
NEW CONSTRUCTION ACTIVITY

Source: U. S. Dept. of Commerce



MANUFACTURERS' INVENTORIES & SALES

Source: U. S. Dept. of Commerce



POSITIVE NEUTRAL INDICATION

NEW

**Mark-II position indicator
for G-E voltage regulators
protects lineman
and equipment**

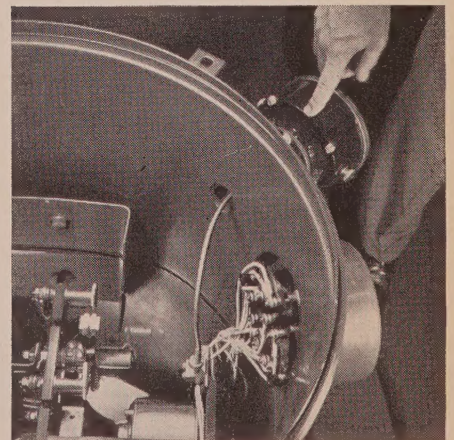
Exclusive Mark-II Load Bonus position indicator and indicator drive system for General Electric single-phase step voltage regulators provide positive indication of tap-switch position. This gives more assurance against fear of injury to personnel or equipment when bypassing regulators on hot lines.

Linemen are aware that if a regulator is bypassed with the tap-switch off neutral position, the dead short created across part of the series winding can destroy equipment and seriously endanger the lineman.

It is important that operating personnel *know* that regulators are in the neutral position before bypassing. The new General Electric Mark-II Load Bonus position indicator provides this assurance.

New Mark-II position indicator system—standard on all G-E ML-32 regulators at no price premium—is an example of General Electric's continuing leadership in voltage regulators. This is another reason why G-E regulators cost less on the line. Ask your regulator representative for more information. General Electric Company, Schenectady 5, New York.

423-43



NEW MARK-II INDICATOR drive system eliminates possibility of indication error. Unique locking coupling and gear-driven indicator assure positive alignment of indicator hand and tap-switch position.

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EEL Year—End Report

Stresses Why USSR Trails U. S. in Electric Power

In its year-end statement released Jan. 1, 1960—for the first time—the Edison Electric Institute gave greatest prominence to the comparison of U. S. electric power achievements versus those of the Soviet Union, stressing the tremendous importance of “maintaining U. S. leadership in electric power under the free enterprise system.”

First, the statement of EEI President Allen S. King established the comparative record in 1959:

1. Electric production of 707 billion kwh, vs. 244 billion kwh for the USSR
2. Generating capability of 183 million kw, vs. 59 million kw for the USSR
3. Use-per-capita of 4481 kw, vs. 1161 kw in the USSR

“There is no indication that the Russians will be able to catch up with the United States at any time in the foreseeable future . . . in this important factor in the competition between the U. S. and the USSR,” predicts the EEI statement. How the electric supply system should be operated is also part of this competition, since it has significant bearing on the form of government under which Americans live, according to the EEI.

But, who wins the “kilowatt race”—in fact, who wins the struggle of these two great nations for world pre-eminence—is *not* the basic issue, the EEI statement stresses.

“It is rather the struggle of two types of civilization—one is based on human liberty, the other on government domination. And, in the drama of U. S.-Russian competition in the broad economic arena, Americans will have to keep clear in their minds that under the Russian system, government owns or controls all business and the



MANAGEMENT MATTERS were subjected to thought-provoking scrutiny by top-level speakers on the recent annual conference for representatives of Middle West Service Co. client companies. EEI's Managing Director Edwin Vennard and Robert K. Greenleaf, personnel director of AT&T were introduced by Middle West's Pres. J. S. Hartt (at right).

Russian people work for the government.”

Mr. King's statement pursued this further, as follows: “The United States has achieved its position of world leadership in electric power through the growth of the electric utility industry in an atmosphere of free enterprise.

“By financing in the free market, the nation's investor-owned electric companies have been able to build an unequaled power supply to meet America's needs. Looking ahead to the future, the companies are fully confident that they can continue to maintain U. S. leadership in electric power under the free enterprise system. But despite the record of accomplishment, there continues to be agitation for more government spending for government power projects.

“If we, as a nation, were to adopt in any field—in the power business or any other—philosophies and practices of government control that are typical of the Russian system, we would destroy the characteristics of freedom and initiative which brought us our world leadership and enables us to keep it. We would then not only lose the competition with Russia, we would lose the human values we sought to save,” concludes Mr. King.

Management Practice — New and Changing Field

Art or profession, the practice of business management is relatively new . . . and constantly changing.

This fact was underlined in the messages of two industry authorities who spoke recently to an audience of utility management gathered for an annual conference that this year marked the 10th anniversary of the independent operation of the Middle West Service Co. About 45 corporate clients of the Chicago consulting firm were represented by nearly 100 executives.

Because management practice is new and changing, both speakers observed, there is great need for continuous attention to improving it. The speakers who developed particular viewpoints concerning important management functions were EEI's managing director, Edwin Vennard, and the personnel director of AT&T, Robert K. Greenleaf.

Mr. Vennard urged a periodic re-examination of management practices. He asked: how many companies are examining their operations searching-ly, at least every five years? And, how many are utilizing outside appraisal to

Ten Years of Middle West

The ten-year story of independent operation of the Middle West Service Co. since Jan. 1, 1950, is one of the most successful growth stories of the utility industry. Under the direction of Edwin Vennard and J. S. Hartt, in this period the Chicago-based consulting organization has served more than 125 clients in the various utility industries, as well as numerous government and educational projects.

Middle West started with 11 client companies in 1950, providing essentially basic engineering services. In the years since, these have been expanded to cover virtually all phases of corporate concern, including business growth, rates and regulation, finance, accounting, real estate, public relations and advertising, employee relations, and more recently new developments such as nuclear research.

Middle West subsidiaries are the Illinois Stock Transfer Co., Twentieth Century Market Research, Inc., and a Bureau of Safety.

make certain the checkup is objective and sufficiently revealing to permit the desired improvement?

Mr. Vennard recommended the use of thorough checks on the costs of operation, noting that in this effort, outside appraisal is especially desirable. He also stressed the need to be sure that top-level committees of the company have access to important new developments in their planning activities.

The EEI head made these further suggestions for reviewing the work of corporate management:

- 1. In the area of forecasting and planning, set up an economics department if you have not already done so.
- 2. In the field of rates, give greater consideration to the effects of inflation and on the basis of it project the need for revenue five or ten years ahead.
- 3. In the field of employee relations, assign a man specifically to consideration of the functional aspects of personnel operations.
- 4. In public relations, periodically examine every corporate function to see what way it affects the public's

KEY MEN on the Middle West Consulting team meet with another speaker on the company's recent management conference program. Shown with T. C. Kammholz (second from left) are (l. to r.): M. R. Rodger, R. McClanahan, R. M. Winsborough—Middle West vice-presidents.

attitude toward your company.

Mr. Vennard referred to "pooling" as a matter that will call for considerable utility management attention in coming months.

Mr. Greenleaf outlined a number of valuable concepts concerning management ability, skill, motivation and attitudes. He listed the basic ingredients of a "good" man and of a "good" manager. Among personal characteristics or traits he considers especially important in management people are: (1) being what you are, (2) having the desire and seeking to grow and (3) feeling a responsibility for the whole organization.

The AT&T personnel director also emphasized the fallacy of the idea that a man can grow without risk. He stressed, too, the fallacy in the idea that decision-making is a wholly rational process. Most are not, he said, because information and experience which can be applied to given situations are limited, so that the decision-maker must draw on his subconscious to fillout the knowledge with which he decides. (See charts.)

Other speakers on the Middle West Service Co. program were: T. C.

Elements of Management Skills:

PERCEIVING

Seeing What Is Really There

Hearing What Is Really Said

Conceptualizing What Must Be Dealt With

PLANNING

Inventing: Objectives, Policies, Procedures

DECIDING

Choosing the Time, the Idea,

the Man to Gamble On

ORGANIZING

Developing and Adapting a Strategy of Action

COMMUNICATING

Talking

Listening

Being

CONTROLLING

Judging, Motivating, Correcting

Ideas That Block the Development of Management Ability

The Idea of "Style" in Management

The Idea That Wisdom Can Be "Told"

The Idea That a Man Can Grow Without Risk

The Idea that Growth Is an Arithmetical Process

The Idea That a "Label" Helps a Man to Grow

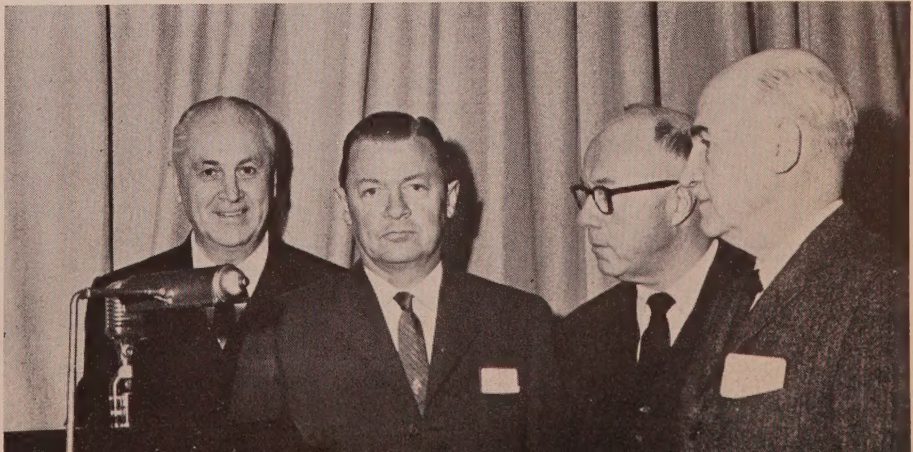
The Idea That Decision Making Is a Wholly "Rational" Process

Kammholz, of the Chicago law firm of Vedder, Price, Kaufman and Kammholz, who discussed "The 1959 Labor Law and a Look Ahead," and Harold H. Young, security analyst with Eastman Dillon - Union Securities, who spoke on the subject, "A Financial Man Looks at the Utilities."

The new labor law is bound to have a profound impact on the national economy, Mr. Kammholz declared. Pointing out that it intrudes more deeply into the private aspect of labor-union operations than ever before, he expressed the opinion that this new law will be with us for a rather long time to come. He dwelt in considerable detail on the "bill of rights" provisions of the new law and the variety of technical changes involved, particularly the new bonding and reporting requirements.

Although Mr. Young evidenced a great deal of confidence in the securities of both electric and gas utilities, he warned against complacency and termed good public relations the life blood of these utilities. There is great need for the utilities to keep their earnings on the way up, he said, since investors are extremely growth conscious. It is also necessary to keep the regulatory commissions aware of this need.

Mr. Young emphasized that growth is the No. 1 question in the minds of prospective utility-stock investors. Thus utilities identified with growth areas are in the most favored position.





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by RALPH ELLIOTT

Washington Editor

Congress Must Settle The Row Over I. R. S. Lobbying-Advertising Rules

The shape of the battle over new regulations proposed by Internal Revenue Service covering tax deductibility of expenditures for "lobbying" and "political propaganda" advertising, indicates that Congress eventually will have to settle the far-reaching issues involved.

It is becoming increasingly clear that if affected taxpayers are to win any substantial relief from the kind of headaches portended by the regulations, it must come through a political contest on Capitol Hill, not a legal contest before IRS or in the courts. Equally clear is the fundamental importance of the stakes involved. For the regulations, if adopted in their present form, easily could become the carrier of potent censorship germs capable of sorely infecting vital areas of freedom of speech.

Recent IRS hearings on the rules brought an avalanche of criticism—not only from electric utilities as represented by counsel for the National Association of Electric Companies and the participants in the Electric Companies Advertising Program—but also from a wide range of businesses, major trade associations and labor unions, including the AFL-CIO.

These objectors pointed out to IRS that the reach of the rules is so dangerously long it threatens the very existence of many businesses. Where clarity and definitiveness should prevail, instead there is ambiguity, leaving wide gaps to be filled by discretionary action of revenue agents. And the sweeping provisions as to what constituted "lobbying" patently conflict with Congressional policy as set out in the Lobbying Act. Another point emphasized was that the regulations are unworkable and will ensnarl the IRS in an administrative tangle, the cost of which will largely offset any additional taxes they may raise.

No individual or organization appeared in support of the new regulations.

Yet, the possibility is remote that IRS will amend them to eliminate or soften provisions so unanimously opposed by affected taxpayers. The reason: IRS is a revenue-raising agency; its primary concern is to get money into the federal till. Its rule-making powers are broad, and historically its administrative practices for the most part have not only won court approval, but have been judicially declared to be part of the taxing laws. One such practice by the Service always has been to leave itself plenty of elbow room in the administration of the tax laws; to build flexibility into the regulations, leaving to their administration the matter of accomplishing fair and equitable results. And so it is with the lobbying-advertising regulations.

This was made clear by IRS Commissioner Dana Latham in a recent discussion of the proposed rules with a group of tax executives. "I do not believe that any individual or group can lay down hard and fast rules which we in the Service can administer with ease," he said. "At best, the picture can only be painted broadly. In administration, common sense must prevail."

Latham also dropped a piece of advice: "If the business interests of this country find that the end result in this area is wrong, their proper resort is to the Congress by way of appropriate curative or remedial legislation."

Some taxpayer groups have been suggesting that IRS should spearhead an effort to get Congress to enunciate national policy and lay down definitive guidelines in the area. But the Service has no intention of initiating such a move. It would be "inappropriate," one IRS official told the writer. He added: "We gave a lot of thought to these proposed regulations. They're the

best we could come up with under all of the circumstances. We'll probably stick to them pretty much as they are—that is, as long as Congress, in effect, doesn't overrule them."

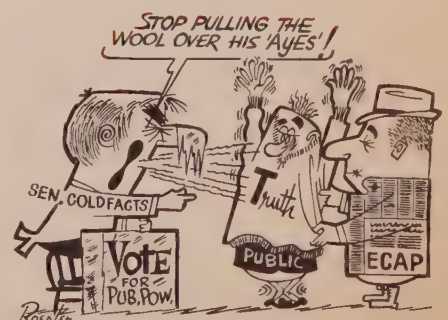
Under the surface there are more than casual indications that IRS would welcome some guidance from Congress. The powers that be in the Service are aware that "changed conditions" to which the new rules should be conformed include changes in government-business relationships, as well as changes in tax laws. But the former, they feel, are governed by political considerations and should be dealt with through legislation, not administrative regulations.

This position, viewed along with the trend of increasing government encroachment in the people's business, underscores the need for legislation to preserve the right of business to make reasonable expenditures—as a business cost—for its self-defense.

The Service is believed to be considering two alternatives as possibilities for getting Congressional guidance, without taking the direct initiative. It can hold the proposed regulations in abeyance and wait to see what comes out of the current House Ways and Means Committee study looking to general revenue revision; or it can adopt the regulations substantially as drawn and let taxpayer pressure for Congressional action take its course.

Meanwhile, rumblings already are being heard from Capitol Hill. Senator

(Continued on page 32)





The Regulatory Requirements for 1960

The Need for Fair Value

Normalization of Taxes under Accelerated Depreciation

Equitable Treatment of Atomic Power Costs

The two most important problems facing industry in 1960 are the Presidential elections and the continuing progress of inflation. The two are closely interrelated.

Whether the new Administration and Congress will be liberal or conservative will doubtlessly influence the thinking of many Commissions, irrespective of the political complexion of their own State Governments. Even before the elections themselves the utility industry may well be under attack by the contending candidates for office, aided and abetted by the public power block both in and out of Congress. This may well give pause to many utilities seeking rate increases, however justified they may be. Essentially the question that must really be decided is whether the needs are pressing enough and whether in the final analysis political harassment would be the lot of the industry in any event.

The economic implications of the coming elections are equally clear cut. The election of a so-called liberal (meaning of course liberal with the taxpayer's money) Administration or Congress will undoubtedly accelerate the current inflationary trend. As it is, even with the present Administration's professed concern for a stable dollar, the consumer price index has gone from 123.7 in October of 1958 to 125.5 in October of 1959. The nearest comparable change in the Handy Whitman Index (1911 = 100) of Electric Utility Construction (North Central Division) was from 592 in July of 1958 to 608 in July of 1959, or an increase of 2.7 per cent. The country's economic climate is such, and such is its defense posture, that under the best of conditions the most that can be hoped for is that the rate of increase in inflation will slow down. There is nothing in the

economic picture to indicate a cessation, let alone a reversal of this trend. It is against this background that the utility industry must plan its future.

The Imperative Need for Fair Value

This is the most important problem which utility management must present to both the commissions and the public for a fair and equitable solution. What the industry should primarily press for is the treatment accorded to the Iowa-Illinois Gas and Electric Company by the Iowa Supreme Court in the now famous Fort Dodge decision. In this instance the court referring to the rate base applicable to the City of Fort Dodge said in part: "We reach these figures under the conditions shown here by giving 70 per cent weight to reproduction costs and 30 per cent to original costs . . ." The court further went on to say that the annual depreciation accruals must logically be based on the same formula.

The Iowa-Illinois Gas and Electric Company quite properly began by accruing economic depreciation on this basis in June, 1958. Reporting on this matter in its 1958 Annual Report, it said in part: "Allowance of depreciation based on fair value of property in Iowa is a significant and enlightened step forward. Application of the income tax to fair value depreciation expense is wholly inconsistent with the theory of a 'profits tax,' as has been pointed out by many others. *We hope that in time our income tax laws will recognize as a business deduction the full or 'economic' depreciation attributable to current operations.*"*

The above reference to the antiquated provisions of the income tax laws are of major interest because of the recent action taken by the Ameri-

can Bar Association with respect to this problem. Here the Committee on Depreciation and Amortization sponsored a recommendation that (subject to the approval by the membership of the ABA) the Federal Government so amend tax laws that a taxpayer will be permitted to take his depreciation deduction for tax purposes based on current rather than on original cost of the property. While the idea behind this resolution (which by the way has been submitted to the House Committee on Ways and Means) is in the right direction, it has as it stands at the moment a number of serious defects which could prove most harmful to the electric utility industry.

The most important omission in the proposals is the fact that no mention is made of the need to "book" such tax depreciation accruals both for accounting and rate making purposes. The Report is strangely silent on both these phases. To make economic depreciation effective and beneficial (which means that depreciation expense should reflect the current worth of the property being consumed in public service) assurance must be obtained from regulatory Commissions that such economic depreciation will be recognized for accounting and also for rate making purposes.

Another safeguard would be for the Internal Revenue Service to issue regulations (which it has in the past) preventing a company from availing itself of the new method of tax depreciation unless it recorded the same amount on its books. It is doubtful whether any Commission would disregard such accounting treatment in the setting of rates. Unless this is done, all of the advantages claimed by the Committee will not only be lost but will also do the industry a tremendous amount of harm. It should be realized of course that making such tax depreciation permissive is not going to stop some Commissions from actually imputing higher

* *Italics supplied.*

tax depreciation when a utility was only taking tax depreciation on an original cost basis.

Another harmful effect which would result from these proposals would be to severely penalize the good earners among utilities and give a windfall to those companies whose earning potential is below standard without any effort on the part of their managements.

Generally speaking in this connection it is of interest to quote a recent statement of a Bell System report called the "Case for Fair Value," which said in part: "A rate base taken at booked dollars (whether a net book cost amount or an invested capital amount) ignores the acknowledged fact that today's dollars are of less value than past dollars. With inflation and a book cost rate base, the dollars of allowed earnings on past investment, although the same in number as when the capital was committed, represent a shrunken value in purchasing power. The investor of 1940 has had half of the value of his capital commitment destroyed (or confiscated or expropriated) by book cost regulation."

"It is wrong. It is inequitable. It is unfair. And rates which produce this result are not 'Fair.'"

"The value approach to fair rates puts the emphasis on rates which 'maintain the financial integrity' of the investment (in Hope case terms) rather than on rates which 'enable the company to attract capital.' Too many commissions have concerned themselves primarily with a rate of return which will attract new capital, to the exclusion of a rate base which maintains the integrity of the past investment. New capital can usually be attracted despite poor earnings simply by selling stock below the market price."

The end result of ignoring fair value is of course confiscation of utility property. It is to correct this condition that the utility industry must enlist the cooperation of both the taxing authorities, the Government and the Commissions in 1960. What will be required is proof that fair value is beneficial not only to the utility but to the community as well, and will in the long run result in better service, fewer rate proceedings, and lower rates to the customers that it serves.

Accelerated Depreciation

An adverse ruling of considerable importance to the utility industry was that the New York Public Service Com-

mission in the Niagara Mohawk Power Corporation case (28 PUR 3d 171) which ordered only actual taxes to be used for rate making. It did qualify this order somewhat by saying; "Effect will be given in rate determinations to actual taxes reflecting to the tax benefits afforded by Section 167." What presumably this meant was the Public Service Commission would increase the rate of return slightly to compensate a company for using the flow-through method under Section 167. As a practical matter there appears to be no such compensation since the PSC found something fractionally over six per cent as the allowable return.

A direct consequence of the above order was the decision of the Long Island Lighting Company to reduce electric rates by \$1,200,000, effective January 1, 1960. While only fragmentary information is available at the moment of writing, it would appear that this reduction is the result of Long Island abandoning the normalization of taxes which it had done previously with respect to accelerated depreciation. Since the New York Public Service Commission has claimed that there is no deferral of taxes, but a permanent reduction thereof, then by the same token it would appear equitable, since there is no future liability, for the Commission to issue an order to transfer the balances in the restricted surplus to earned surplus, thus making it a part of the stockholders' equity. A similar treatment was accorded recently by the Maine and Missouri Commissions. The foregoing action by the Long Island Lighting Company may well be a development which the industry should watch in 1960.

In direct opposition to the ruling in New York was that of the Illinois Commerce Commission in the case of the Union Electric Company. The Commission said in part: "Many of those who claim that permanent tax savings result from the application of Section 167 admit that for individual units such application results in only 'tax deferment.' Some will even go so far as to admit 'tax deferment' with respect to a group of units installed in one year; but somehow in a composite picture of many units installed over many years in a continuously growing property these parties miraculously are able to convert an accumulation of tax deferments into permanent tax savings. Such, in our view, is directly in con-

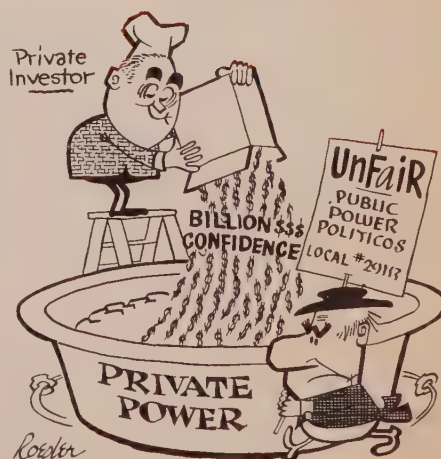
flict with the axiom that 'a whole is equal to the sum of its parts.'"

And, the Commission opinion continued:

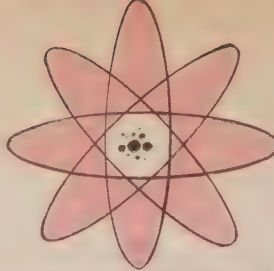
"In our opinion there is no more basis for such argument than to say that the continually increasing balance in Accounts Payable, Injuries and Damages Reserve, or Pension Reserves in a growing company will never have to be paid. In all such cases estimates must be employed, but if carefully made they are not to be rejected as fictitious."

An important decision which is still pending is that of the California Commission which has held extensive hearings on the treatment of liberalized depreciation. The weight attached to any pronouncement of this Commission may have an important bearing on how other Commissions will act with respect to the rate making and accounting treatment of Section 167. It is hoped that in 1960 the industry will press for the treatment accorded to Union Electric, since the stakes involved are not only substantial at the moment, but will grow with each passing year. Quite apart from Congressional intent that all taxpayers benefit by the provisions of Section 167, the fact is that unless taxes are normalized gross discrimination will result between the taxpayers of today who will be relieved of a just portion of their tax burdens while the customers of tomorrow will by the same token be penalized by higher taxes. The utility industry has another important element at stake here, involving its future financing program. One of the advan-

(Continued on page 32)



THE PROOF IS IN THE PUDDING!



THE FUTURE PRICE OF U-235 (in terms of 1959 dollars) should not increase and a decrease might be warranted, concluded a special AIF committee after studying classified AEC data pertaining to uranium ore reserves, procurement of ore, refining of ore, conversion of UF₆, and production of uranium enriched various degrees of U-235. The committee (K. D. Nichols, P. F. Brundage and Wm. Webster) decided that U-235 prices charged by the government do not include a subsidy. These additional conclusions were reached: (1) if a future price reduction is contemplated, the element of subsidy contained in the four per cent per year use charge to industry must be considered; (2) present published prices would not have to be increased, even if uranium processing plants were operated on a partial basis for non-military uses, in the event weapons production requirements were terminated; and (3) no new major plant construction for U-235 separation capacity will be needed for at least 15 years.

FEDERAL-STATE CONFLICT on safety considerations involved in constructing nuclear reactors arises for perhaps the first time in Minnesota. The AEC staff has recommended that construction of the 22,000-kw closed-cycle boiling water reactor at Elk River can proceed without undue hazard to the public; and the AEC's general manager indicates that an early start on the Commission-owed project is planned, but Gov. Freeman informed the Commission that compliance with regulations of the state's board of health must be forthcoming also. Negotiation of differences appears likely, rather than resorting to litigation.

ACCOUNTING METHODS TO BE USED in the operation of a nuclear-fueled boiling-water reactor electric generating station were prescribed for Consumer Power Co. by the Michigan Commission in Case D-875-A-592. The company had petitioned for directions as to accounting treatment for disbursements and expenses incurred in the construction and operation of the station. The Commission found that the company was deemed to have the responsibility to engage in research and development work . . . and the company's participation in such program was desirable and in the public interest and that research aimed at achieving lower fuel costs is timely; that its design is well advised; that its location in the system will be useful; and that the total estimated cost, viewed together with the annual charges sought to be imposed, are not disproportionate to the financial ability of the company. As to accounting, the Commission ruled that: The costs and expenditures associated with the research and development for the commercially competitive use of nuclear materials in connection with the generation of electric energy should be charged to Account 801, Miscellaneous General Expenses; that the total scheduled charges to be charged to Account 801 not to exceed \$1,500,000 annually; and that the maximum amount to be authorized to be included in Account 146 (Other Deferred Debits) should be \$12-million. (See "Regulatory Review," page 24.)

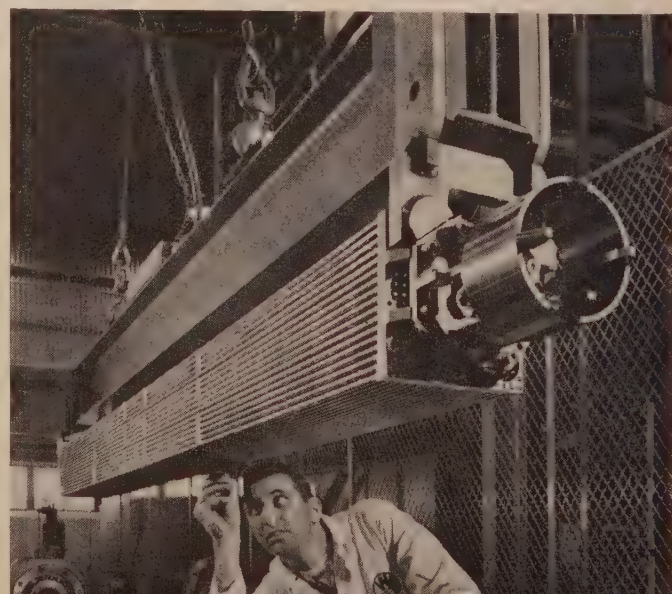
NUCLEAR ENGINEERING GROUP recently established in the engineering department at Niagara Mohawk Power Co. is significant as an indication of the new recognition being given to the special demands of this new field upon the technical competency of utility staffs. Key decision is: how much does a utility rely on suppliers for the know-how . . . and how much does it beef up its own staff to keep pace with developments? Niagara Mohawk's newly organized group will make engineering studies and analyses of its own to determine the best type of atomic plant and when to build it.

UK's FAST BREEDER EXPERIMENT at Dounreay, now operating, is providing data on the physics and control characteristics of this type of system, following which there is to be a period of intensive development and testing of different types of fuel elements. And, at the AEC's National Reactor Testing Station in Idaho, another new tool—the Argonne Fast Source Reactor (AFSR)—is also now operating and augmenting studies of fast reactor physics, already coming from another Testing Station facility, ZPR-III.

FAST NEUTRON ENERGY SYSTEM characteristics will be studied, beginning in mid-'60, on a new critical experiments facility, for which the AEC last month granted a construction permit to North American Aviation's Atomics International Division.

SODIUM, HEAVY-WATER reactor concept, studied by a special Commission-appointed task force, is evaluated in a new report (TID-8515), available for 50 cents from Commerce Dept., OTS, Wash. 25, D. C. Other task force reports cover fluid fuel reactors (TID-8507, \$1.75) and small-size nuclear powerplants (TID-8508, \$1.75).

YANKEE FUEL ELEMENT assembly, being inspected at Westinghouse before shipment, is one of 76 units for the pressurized water reactor being built at Rowe, Mass. The eight-ft long assemblies hold 304 stainless steel tubes, each with 150 pellets of slightly enriched uranium oxide.



How Geography Affects Area Development of Puget Power

Geography makes a difference in the area development approach of Puget Sound Power & Light Company—a utility serving a growing 3,200 square-mile area in the extreme northwest corner of the United States.

In 1957 President Frank McLaughlin called in the internationally famous firm of Arthur D. Little, Inc., to make a comprehensive study of Puget's territory. Their report to the Company outlined short-term and long-range opportunities for industrial growth, along with a 12-point program for area development. In August 1957 Stewart G. Neel was named full-time Manager of Area Development.

In addition to the report on industrial opportunities, Arthur D. Little also compiled factual data on each of the nine counties in Puget's service area. Finally they made a listing of over 15,000 acres of available and potential land best suited for industrial use. The area development department then secured an excellent set of reference maps covering the Puget Sound region, plus additional factual data on many subjects.

A quick review of the manufacturing economy of the Puget Sound region indicates that roughly *one-third* depends on the transportation equipment industry, dominated by Boeing Airplane Company. Another *one-third* depends on the forest products industry—lumber, plywood, particle board, hardboard, softboard, pulp, paper and other wood products. *One-sixth* depends on commercial agriculture and food processing. The final *one-sixth* depends on diversified manufacturing, dominant companies being in electronics, steel, cement, aluminum, chemicals and oil refining.

Even such a brief review of the economy clearly reveals its imbalance, the lack of diversification, and the fact that the Puget Sound region has not yet developed an industrial complex.

To state it another way: The forest products industry, agriculture and food processing are based on raw materials of the region. Boeing Airplane Company is located in Seattle only because it was home for the Boeing family. Some building materials companies use regional resources, and the aluminum industry was originally attracted

by low-cost hydroelectric power. Remaining diversified industry is largely oriented to local and regional markets.

An analysis of industry by standard industrial classification leads to the conclusion that much of the short-term growth will occur in diversified manufacturing, when quantities of goods consumed justify regional manufacturing. Population in the Pacific Northwest (Washington, Oregon, Idaho) represents about 3% of the nation's total. Sales of industrial and consumer goods in the region tend to be about the same percentage of national totals. This market limitation is a definite restraining factor on many manufacturing companies.

The area development approach taken by Puget Power was to consider quantity and value of manufactured goods consumed in the Pacific Northwest but manufactured elsewhere, and try to determine the more logical areas of opportunity. After some detailed studies, the company settled on seven standard industrial classifications. From business reference guides a list of 1,200 leading companies in these classifications has been compiled.

Using direct mail, this list is circularized four times each year with special reports, brochures and other material of current interest. Very little space advertising has been used. This has resulted in generating a direct prospect list of just over 100 companies that have expressed some interest in the Puget Sound region.

Another part of the area development program is work with communities and community organizations. Puget Power encourages comprehensive planning and zoning, and works with industrial councils, chambers of commerce and other civic organizations.

Working with others in the industrial development field is also important. Puget Power maintains close working relationships with the Washington State Department of Commerce and Economic Development, the Puget Sound Industrial Development Council, the Seattle Area Industrial Council, industrial departments of railroads, industrial realtors, and developers of industrial districts and parks.

The Manager of Area Development makes three or four trips each year to various parts of the country, calling on prospects. This idea was expanded early in 1959 when a twelve-man delegation was formed from the State of Washington, including Governor Albert D. Rosellini and Seattle's Mayor Gordon Clinton. They met and spoke to groups of businessmen and industrialists at luncheon meetings in Boston, New York and Philadelphia. The response was so enthusiastic that such State delegations will probably continue in 1960, visiting other cities.

Principal factors affecting the growth and development of the Pacific Northwest are (1) population and markets, and (2) the fact that the region is not well known. For the next few years these considerations will help to shape the area development program of Puget Power.

PUGET POWER'S area development activities are reviewed by Area Development Manager Stewart G. Neel and R. F. Plymire, vice-president for sales.



Canadians Plan '60 Start On Peace River Project

A construction start on the biggest single hydro power installation in the world seems certain in 1960.

Proposals containing a firm commitment to carry out the project to completion were to have been given to the British Columbia government before the end of 1960, after the board of directors of the British Columbia Electric Co. Ltd. met early in December and approved final plans for development of the \$610-million, 4-million horsepower project on the Peace River west of Fort St. John.

Sir Andrew MacTaggart, chairman of the board said that if approval of the plan by the government and its

agencies is received in time, "we will definitely go ahead with the project in 1960."

Pre-requisites to the start are approval by the B.C. Water Rights Board, the Public Utilities Commission and the government. These are considered by observers to be assured. But, since the project has consistently received the support of the government, a construction start is all but certain.

U. S. and Canada have agreed on a final draft of principles to be applied in the determination and apportionment of benefits—including power—from cooperative development of the Columbia River.

First phase of the project—which would entail building near Hudson Hope of a 600-foot dam over one mile long at its crest—will cost \$375-million.

REGULATORY—Cont. from p. 29

tages of non regulated industry is its ability to self-finance the major portion of its requirements. This not only results in economies in the cost of new financing, but it also improves the equity position of the existing stockholders, since the amounts of new equity requirements are materially reduced. It is believed that regulatory Commissions should keep this factor in mind considering the volume of future capital requirements of the industry, and that increased internal financing by the utility industry will not only help its existing stockholders but also the public in the savings that it effects in raising additional new capital.

Accounting Treatment for Atomic Power Costs

An important contribution to the future development of atomic energy and one which may well set a pattern for the future was made by an opinion and order of the Michigan Public Service Commission in the case of the Consumers Power Company. Essentially the Commission said that for accounting purposes the excess capital costs and development expenses of a nuclear plant should be written off over a considerably shorter period of time than that of a conventional fuel fired station. The Company's petition said in part: "... that it be granted authority to amortize the amount by which the cost of constructing a boiling-water

atomic reactor and related facilities of a capacity of 50,000-kw to 70,000-kw shall exceed the cost of constructing a conventional electric generating plant of similar capacity by charges to Account 801, Miscellaneous General Expenses, such charges to be made over a period of years estimated to be entirely amortized by 1973. At the hearing upon the matter, the petitioner supplemented its petition by requesting that it also be authorized to amortize the further amount of \$2.5 million, which petitioner expects to expend in connection with fuel research associated with the proposed boiling-water atomic reactor, by charges to Account 801 over a period of years."

While the Commission in substance agreed to this proposal, the real test will come when Consumers Power Company will ask for a rate-making determination of this order. At the moment it is the stockholder who is underwriting the expenses of nuclear development, and not the customer who presumably will be the eventual beneficiary of such development. Even more important, the foreshortened period of amortization is a recognition by the Commission that a major breakthrough in nuclear development may well obsolete nuclear plants, both existing and under construction. The opinion and order of the Michigan Commission may well serve as a model for similar treatment of atomic projects in other jurisdictions.

The announcement is probably the biggest industrial news in B.C. history, rivalling or surpassing that of the huge Aluminum Co. of Canada project at Kitimat-Kemano.

The project is expected to help make the 1960's "boom" years for B.C., since the construction phase will take five to six years. After 1966, the huge block of new energy would attract new industry.

Washington Outlook

(Continued from page 27)

Kefauver, curiously enough, has come out with a blast at IRS, charging that the proposed regulations "would give special tax privileges to corporations for propaganda campaigns." It was Kefauver's complaint, spurred by public power forces, that led to former IRS Commissioner Harrington's 1958 ruling that ECAP expenditures are non-deductible. The regulations now under study, Kefauver asserts, would "reverse" Harrington's ruling.

He goes on to make the ridiculous claim that the present Commissioner is without authority to change a ruling. "If there is such flexibility in the law as to allow such a change in rulings," says the Senator, "consideration of more exact standards and language should be given by the Congress."

Rep. Brooks (D-La.) has declared that the regulations raise "important issues" which Congress must face. "I feel strongly that we are stepping on dangerous ground when we allow any department of government to encroach in this (advertising censorship) field," he said. "The recent activity of the IRS . . . has been the result of pressure applied . . . by forces in and out of Congress which favor more government in the electric power business."

"Whether advertising is done to meet private competition or competition from the government cannot make any difference in principle. In fact to me we should be even more jealous of the right of private business and industry to protect itself against government than against private competition because of the police power inherent in government."

All of which points to the danger that the merits of the effort by a large segment of American business to defend some of its fundamental freedoms may be overshadowed by the emotional issues involved in the public vs. private power controversy.

EL&P's Annual "Look-Ahead" by 15 Industry Leaders:

S. L. Drumm

President, West Penn Power Company

E. L. Lindseth

President, Cleveland Electric Illum. Co.

C. E. Oakes

President, Pennsylvania Power & Light Co.

Kimball Jack

Vice-President, Washington Water Power Co.

W. H. Senyard

Vice-President, Louisiana Power & Light Co.

Wm. H. Zimmer

Vice-President, Cincinnati Gas & Elec. Co.

E. O. George

Vice-President, Detroit Edison Company

L. T. Cale

Manager, Comm. Sales, Alabama Power Co.

P. R. Schepers

Farm Services, Consumers Power Company

P. W. McCormick

Industrial Sales, Union Electric Company

R. G. MacDonald

Vice-President, West Penn Power Company

R. P. Lee

Area Development, Conn. Light & Power Co.

A. S. Griswold

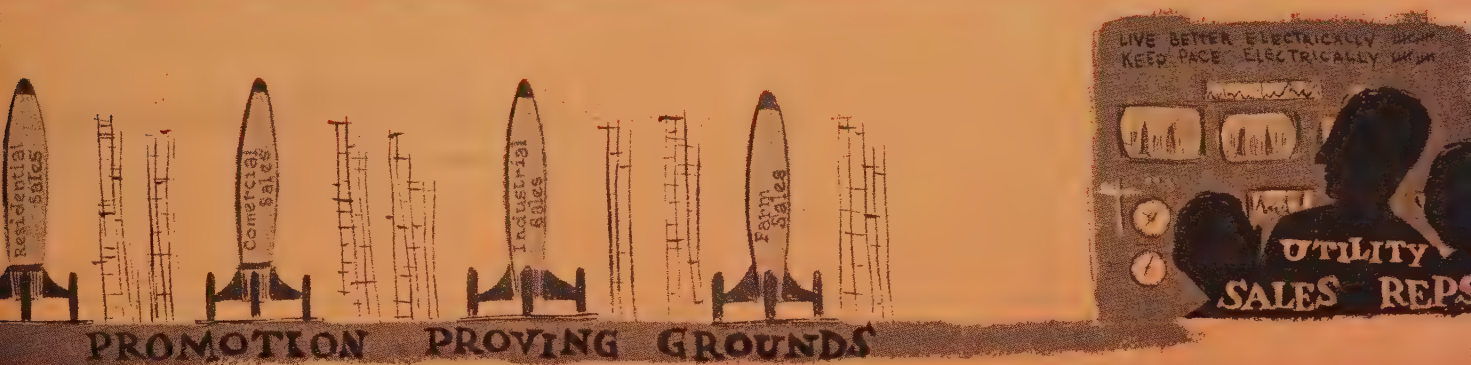
Vice-President, Detroit Edison Company

H. T. Simpson

Boston Edison Company

A. J. Naquin

New Orleans Public Service, Inc.



ELECTRIC UTILITIES

IN 1960:

101 Ways to Improve
Plans, Management,
Performance—

Management Practices

"The challenge to the industry is to stimulate all companies not only to adopt improved management practices, but to further improve them in company and industry actions," says S. L. Drumm, Chairman, EEI Management Practices Committee



Key Problems, Challenges in '60

1. Combating government power growth
2. Atomic power developing
3. Keeping cost of electricity low

ELECTRIC utility top management faces critical challenges in a number of key areas in the 1960's. Here are three of the most important ones:

1. Combating the continuing trend to government power.
2. Advancing the best development of atomic energy as an economic method of generating electricity.
3. Keeping the cost of electricity at the lowest possible level and still serving satisfactorily the interests of the customer, employee, shareholder, and public.

Actually, these problems are all inter-related and how well we solve them will largely determine the future health and welfare of the industry. Their satisfactory solution will require the highest degree of management statesmanship and calls for raising the sights of the entire industry. Acceptable answers will be found only through the total mobilization of the imagination, initiative, resourcefulness, and knowledge of the industry as reflected in improved management practices within individual companies and augmenting company

actions with appropriate industry actions.

To better identify short and long range problems of the industry and to determine top management's role in solving them through better management practices, a new EEI committee, the Management Practices Committee, was formed just about a year ago. This committee of twelve top-level executives will develop and disseminate information on improved management practices throughout the industry. It will sponsor management study projects and, as desirable, conduct seminars and discussion groups on this vital subject.

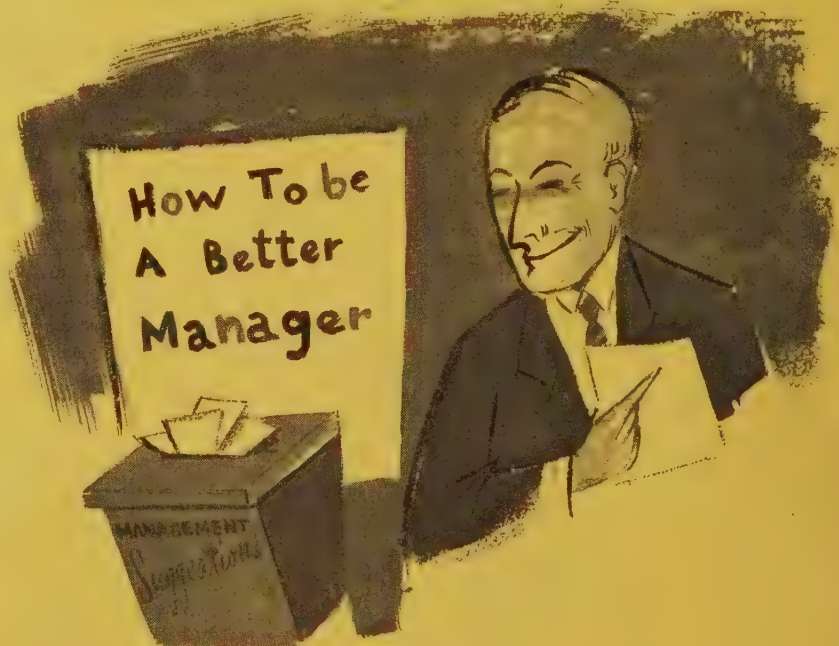
The committee has just completed a survey of electric utility management practices, a project in which each of 39 companies described an outstanding practice in use by that company. Practices described included organization structure revisions, employee stock plans, stockholder meetings, and cost control, public information, community development, supervisor training, and policy formulation programs.

This initial research has been most encouraging. As represented by these individual companies it indicates the

industry generally is alert to its problems and is applying itself energetically to their solution.

Individual companies are reorganizing, following the most modern management organization principles; they are increasingly making use of computers and other electronic business machines; they are training all levels of management in modern management philosophies and practices; they are adopting improved information and education programs for their employees and stockholders; they are aggressively applying cost reduction programs; they are adopting written policies and systems and procedures, and they are enlisting to a greater degree the assistance of employees and others in solving the problem of government power.

The challenge to the industry is to stimulate all companies not only to adopt improved management practices but also to contribute to the further improvement of these practices both as they apply to individual company and to industry actions. Only in this way can the industry attack the problems which face it with all its resources and be assured of satisfactory solutions.



Customer, Employee, Investor Relations

"We now have a place for study and exchange of information on a most basic industry problem—maintaining and improving good relations with people so important to our continued progress,"

says Charles E. Oakes, Chairman,
Executive Committee, EEI Relations Division



Key Problems, Challenges in '60

1. Improving organization in relations activities
2. Closing gaps in employee and public understanding
3. Widening local equity ownership

FOR THE FIRST TIME in EEI a place for study and exchange of information on one of the most basic problems of the industry—the maintenance and improvement of good relations with the people so important to the continued progress of the electric companies—was provided when the Customer, Employee and Investor Relations Division of the Institute was formed about a year ago.

Through the committees of the Division, electric company executives of like interest and responsibility now have the opportunity of exchanging views and experiences in a way which can be of great value to their companies' policies and practices. In considering different ways in which good relations are achieved, the functional aspect is of prime importance—that is, how the electric company should conduct itself in every phase of its operation so that its customers, employees and investors are glad to do business with the company and be associated with it. Also of great

significance is the informational aspect—how a company can communicate effectively with the many different groups of people with which it is concerned.

A significant result of the work already done by the Division's committees is a growing recognition by electric companies of the need for better organization in their customer, employee and investor relations activities. We have recommended that companies make sure their public relations organizations have the best-qualified man responsible for relations with all segments of the public, that he report directly to the company chief executive, and that the department be adequately staffed.

Employees make up the key group in communicating what the electric companies are and how they serve the public. We have found that there are serious gaps in employee knowledge and understanding, not only of their own companies and industry, but of the American economic system as well. Accordingly, we have urged that companies allot time to regular monthly conference sessions, in which small groups of employees discuss matters of importance to their company and the industry as a whole. The Institute has two employee courses, "The American Economic System" and

"American Freedom" already available and in use, and a third on the economics of the utility business, available soon.

Investors also constitute a vitally important group, not only because they provide financing for the industry's continued growth, but because they can be an informed and effective force in telling the industry story.

It is clear that annual reports, necessary as they are, do not create an active interest in the electric business. Local meetings of stockholders are helpful, as are other activities, but we need to search for additional ways to increase their knowledge and gain their effective support. One way to do this may be to widen equity ownership locally. Local shareowners have a close personal interest—they are our customers, our employees are their neighbors and friends, and they see our business at close hand.

We need the understanding and support of all segments of the public if our industry is to continue to grow in the service of America. We must have effective lines of communication to them and we must not hesitate in providing them with the facts of our story.

We have an excellent story to tell about our ability to meet the nation's growing loads, and the companies are obligated to tell the story now and often.





Customer Relations

"In the industry's relations with its customers is the need for their full awareness and understanding of the value of service they receive from investor-owned electric companies—involving questions on inflation, taxation and economic education," says Kimball I. Jack, Chairman, EEI Customer Relations Committee

Key Problems, Challenges in '60

1. Developing awareness of service values
2. Establishing utility's local identity
3. Maintaining an idea clearing-house

A HIGHLY important problem in the industry's relations with its customers is the need for their full awareness and understanding of the value of the service they receive from investor-owned electric companies. The EEI Customer Relations Committee and its six special subcommittees covering functions, attitudes and measurements, speakers' bureaus, communica-

tions research, audio-visual aids, and special groups are studying ways in which local companies can bring to their customers a better realization of the value of electric service.

In its first year the Committee has proved to be a most helpful meeting ground for company people with customer-public relations responsibilities who both give and receive new ideas on what their individual companies can do to increase the appreciation of customers through the functional day-to-day process of serving them with electricity. In addition, the many methods of communication with customers are discussed.

In the coming months, particular attention will be given to the problem of local identity. A disturbingly high percentage of our customers do not know that they are served by investor-owned companies. Surveys have shown this percentage to be on the order of 30-percent or more. The more we have examined this question, the more serious it appears, since it becomes apparent that efforts to inform customers of

the value of their service are seriously handicapped if many of them are under the impression some other type of utility organization ought to get the credit.

The "value of service" theme has as important corollaries questions on inflation, taxation, and economic education of customers in general, and the Committee will study and report on ways in which these and other subjects have been and can be effectively presented by local electric companies.

In addition to acting as a clearing house and source for ideas relating to the over-all theme, the Committee serves as a medium of exchange for information and experiences in other customer-public relations areas.

To facilitate this process, the Committee has just begun the publication of the "Customer Relations Newsletter," for distribution among the companies. In it are presented brief accounts of local activities, new programs, special events, and other developments and information of interest to company executives working in the customer-public relations field.

Industrial Relations

"The big challenge facing employer-employee relations people in 1960 and the years ahead is in continuing efforts to maintain the peace and harmony already existing,"

says W. H. Senyard, Chairman, EEI Industrial Relations Committee

A CRACKER BARREL philosopher once made the remark that as people grow older they don't change, they just get more so.

And so it seems to be with the problems of our industry—they just get more so.

Communications is a much maligned word—threadbare and worn, but its proper realization is still the big stumbling block in our industry having its deserved acceptance and support. We are not trying to communicate just for the sake of communicating but to achieve understanding. Through proper understanding we could devote more

of our energies to operating our properties rather than continually beating out brush fires which sometimes threaten to consume us.

Many of our industry's problems of communications today lie within the scope of its employer-employee relations people. In the Edison Electric Institute, we call it the Industrial Relations Committee.

The big challenge facing this group in 1960 and the years ahead is of course, in continuing efforts to maintain the peace and harmony that have for the most part characterized the company-employee relationship, while



Key Problems, Challenges in '60

1. Communicating better for better understanding
2. Developing the "next team"
3. Finding ways to win employee support

at the same time keeping costs within practical limits.

Among other items, though, there are two that will be demanding of time, thought and energy. One may be termed a sort of development program—to assist in the development of capable replacements to step into the important posts to lead and defend our companies and industry in the crucial years ahead. Some might identify this as a phase of the selection process. And, in a sense it is. For we must

exercise greater discretion in our selection procedure if we are going to have the “horses” with which we can win the race.

But beyond that, all segments of our industry need to give planned attention to the development of the “next team” that will be directing the affairs of our companies. The Industrial Relations Committee is including this as one of its major discussion items in the months ahead.

The other, of course, gets us back to

communicating. Through a forum such as that provided by the meetings of our Industrial Relations Committee, we hope to find more and better answers, techniques, procedures, plans or programs that will help each company in its efforts to enlist the enthusiastic support of its employees on all matters having to do with the well-being of our industry.

Better answers are there. We hope to find them.



Key Problems, Challenges in '60

1. Supplying capital for expansion
2. Overcoming restrictive regulation of earnings
3. Informing the public about rates

Investor Relations

“To compete in the capital markets, utility managements must keep costs to a minimum . . . and seek rate increases when and where warranted, early and vigorously,” says Wm. H. Zimmer, Chairman, EEL Inventory Relations Committee

Utility operating revenues must first be used to meet operating costs, pay taxes and provide for depreciation. Next in priority is interest on debt, then preferred dividends and what is left belongs to the common stockholders. Continued inflation results in a steady increase in operating expenses and this, along with the recent rapid rise in interest and preferred dividend rates, will require greatly increased revenues to maintain the previous level or to improve common stock earnings.

As a reward for the risks assumed, common stockholders are entitled to a growth in earnings and, for utilities to successfully compete in the capital markets, their earnings must be commensurate with those of unregulated industry. To accomplish this, utility managements must, in addition to keeping costs to a minimum, seek rate increases when and where warranted, early and vigorously.

Everything possible should be done to overcome the reluctance of regulating bodies to relax their overly restrictive regulation of earnings. Strenuous efforts should be devoted to improvement in rate base and rate of return regulation, to the end that the industry's earnings may be truly commensurate with those in unregulated industry.

A very important part of the rate program of all utilities should be increased efforts to tell their story to the public. Certainly people will understand that the electric industry alone can no longer hold the line on prices, and they will be surprised to learn that

since World War II electrical energy is about the only item for which prices have remained stable or decreased. A fully informed public is the electric industry's best defense against both inadequate rates and the threat of subsidized government power.

PREDICTIONS are that the electric industry will double within the next ten years. This expansion, coupled with spiraling prices, will create one of the industry's most important problems—that of maintaining earnings at a level adequate to support the tremendous amounts of new capital which will be required.

During the past years, less than one half of the funds required by the industry for capital expenditures have been derived from internal sources. The balance has been obtained from the investing public through the sale of debt securities, preferred and common stock. There is no reason to believe that a larger portion of future construction expenditures will be financed from internal sources. Therefore, investors will be called upon to supply ever-increasing amounts of new capital, much of which must be risk capital in the form of common stock.



Electrical Sales

"Probably the most important step to be taken is extension of unified effort from a national to a local level, with final success depending on local initiative and cooperative effort," says E. O. George, Chairman, EEI Sales Division

in their homes, stores and factories during the 60's.

This potential success can be remedied only by maintaining a hard-hitting competitive program sincerely supported by those either selling electrical products or kilowatthours.

We in the electrical industry find ourselves in a most fortunate position—the market is receptive to our products and they want what we have. They do need, however, the encouragement which such an all-out industrywide effort can give them. In short, we must sell! But sell positive! This has now been made easier for us because we have recognized that all of us have a common goal and can pool and schedule our individual efforts advantageously. This also has a secondary benefit. In effect we have, each of us, increased our selling force by the addition of all of the sales personnel of every other utility or manufacturer in the electrical business. Because we have this common

goal we are all selling for each other.

That this unified activity be continued is most important to each of us because it is still far from achieving the full benefits that will be eventually realized. There are still many steps to be taken and probably the most important among them is the extension of the unified action from a national level to a local level. It is here that a real realization of the benefit of the program will finally be achieved. In fact it might be said that the final success of our program will depend on the local initiative, cooperative energy, and effort.

But all of this will not just happen. It is going to require even more effort among leaders in every locality than has been expended on the national level. The 60's can really be a decade of electrical acceptance if there is, both nationally and locally, the continuing cooperative unity, energy and effort that have been shown in 1959.



Key Problems, Challenges in '60

1. Maintaining hard-hitting competitive program
2. Continuing unified promotion activity
3. Selling . . . and selling positive!

NINETEEN HUNDRED FIFTY-NINE was the first full year of practical application of unified effort on the part of our industry and demonstrated sufficient success to obtain the increased cooperation of the electrical industry. The 1959 effort promises real success in getting the American public to live electrically and think electrically

Commercial Sales

"We can render a great service in helping commercial customers make broader, more profitable use of electric service, while increasing net return on our own plant investment," says Luther T. Cale, Chairman, EEI Commercial Sales Group

PAUSING at the threshold of 1960 and a new decade, we of Commercial Sales, reviewing results of the past year and scanning new opportunities in commercial load-building for the year ahead, are highly gratified with past progress and accomplishments.

Looking ahead we are keenly aware of the tremendous challenge and the growing need to motivate our industry and its allies in a "hard-hitting, stepped-up" sales promotional program during 1960.

We feel that such a program should be designed to further sell the expanded use of all commercial electric services in two vast markets, (1) Modernization of existing commercial structures, and

(2) New commercial construction.

During the past two years gratifying progress has continued in the promotion and sale of commercial electric services—higher level quality lighting installations, year 'round air conditioning including the heat pump, comfort heating, electric cooking and water heating.

Commercial and institutional buildings, expanded shopping centers, stores, office buildings, banks, service stations, schools, hospitals, and the national highway construction program will play major roles in modernization and new construction opportunities for commercial sales.

The importance of a hard-hitting



Key Problems, Challenges in '60

1. Consolidating forces selling "all-electric"
2. Utilizing new opportunities in lighting
3. Emphasizing acceptance of electric heating

commercial revenue-building program to continue the successful promotion of good lighting and especially the "directly-competitive" services is recognized by many utilities who already are expanding their commercial sales departments and accelerating commercial sales activities. However, more electric utilities need to join hands, to consolidate forces in this all electric commercial sales crusade. We are encouraged with increasing top management interest and backing, which are "musts" if we are to successfully implement such a program, to take advantage of new opportunities and to meet the continuous increasing inroads of direct competition.

Specific projects and problems, opportunities which offer a tremendous challenge, and which will be vigorously pursued during 1960 by EEI Commercial Committees and member companies include:

- Broader promotion of commercial lighting and the benefits to be derived from higher lighting levels and new standards (as recommended by the Blackwell Report)
- Continued emphasis and promotion of the fast-growing acceptance of commercial heat pumps and electric comfort heating

- Continued promotion and acceleration of the upward trend in commercial and institutional uses of electric cooking and water heating
- Utilization of unprecedented opportunities, created by the new Inter-State Highway Program, for achieving higher standards and broader acceptance of traffic safety lighting for America's streets, thoroughfares, and highways.

Spearheading such an ambitious and promising program on a national level are the four committees which have the key responsibility of providing leadership, program planning, and guidance in the promotion of the major commercial services — lighting, electric comfort heating and air conditioning, electric cooking and water heating, and street and highway lighting.

And, we who have the principal responsibility for developing and selling this important market, by doing a good sales job in 1960 and the years which follow, can render a great service in helping commercial customers make broader and more profitable use of commercial electric service and, at the same time, help our industry and our companies to increase the percent of net return on an ever-increasing plant investment.



Key Problems, Challenges in '60

1. Improving cooperation in education, marketing
2. Developing standards for manufacturers
3. Counteracting competitive fuels

Farm Sales

"The 'Farm Better Electrically' program will embrace all segments of the industry . . . with profits for all who participate in these efforts to increase production through automation," says P. R. Schepers, Chairman, EEI Farm Group

IN LOOKING ahead to 1960 we can see great promise in the Electrification of the American farm. Never before has interest and enthusiasm in the farm market run so high as all segments of farm equipment industry take a new look at the possibilities of selling the farmer the many items of labor saving, profit making electric power equipment.

The Farm Group for this year is the largest in the history of EEI. It is comprised of 71 hard working members, all assigned to committees with much of their effort pointed to increased sales. Special emphasis is being placed on activities which will develop higher levels of cooperation among all allies

in both educational and marketing fields.

The number of farmers in this country is declining steadily, however, those who remain in the business are becoming more specialized and are rapidly expanding their farming enterprises. Automatic operations help them to attain high levels of production. This automation can best be done with electric power and we in the Farm Group intend to sell and resell this idea. It was for this purpose the Farm Better Electrically program was organized in 1957 and with the "shot in the arm" it is receiving this year, it will develop into a program which will embrace all segments of the industry with profits



for everyone who participates, including the farmer, the manufacturer, distributor and dealer, the educator, the press, and the power supplier.

A joint organization of the Farm and Rural Market Development Committee of NEMA and the Farm Group of EEI is working to coordinate sales activities of these two national organizations. An attempt will be made to develop stand-

ards for equipment manufacturers. A study will be made of the electrical farm equipment market and a program developed to counteract competitive fuels activities.

In the coming year the Farm Group will strive for greater acceptance of the Farm Better Electrically program through developing advertising and other promotional material designed to increase sales for power suppliers and

equipment manufacturers. It will bring together all organizations interested in agriculture and in the use of electricity in farming with a view of helping rural people to live and farm better electrically.

The accelerated program for 1960 presenting a united front will assist in reaching the goal established for 1965—10,000 kwh per farm average in the United States.

Industrial Sales

"By assisting our industrial customers in using modern industrial tools applying electric energy, we are contributing to the nation's prosperity by increasing productivity,"
says P. W. McCormick, Chairman,
EEI Industrial Power and Heating Group

ern technology, we must eliminate the obsolescence and bring our industrial plant up-to-date.

Industry is hard at work battling quality, low unit cost and sales. Presently, at least one-third of methods and equipment used are obsolete.

The electric utility industry can contribute much to assist the industrial plant in achieving greater and greater productivity with a labor force which is growing less rapidly than is the total population. We can assist industry in this task of modernization because we have the know-how to apply electric energy so that it becomes one of the most important tools of production.

The Industrial Power and Heating Group of Edison Electric Institute is devoting its time and energy to doing a better job of promoting the increased use of electric service in the plants of our industrial customers in order to help them raise their production levels.

The Power Sales Manual, prepared

and directed by the group, is an example of continuous training of power sales engineers. A Home Study Course for power sales engineers, based on the Power Sales Manual, is now in preparation.

Industrial electric process and space heating is an important promotional activity. As we are able to satisfy a customer's requirement, that customer benefits from the use of such heating equipment. Just released by EEI Headquarters for use by the Industry are nine industrial heating mailers. Three of these deal with Comfort Heating; three on Winterizing and three on Processing. Plans call for six additional mailers to be prepared during 1960. All appear under the common heading, "Electric Heat Illustrated."

The entire electric industry has at its disposal one of the most effective means of increasing productivity in the industrial plant—good illumination. By scientific means we have now demonstrated



Key Problems, Challenges in '60

1. Assisting industry with know-how
2. Cooperating with allies in promotion
3. Extending training with new tools

THE YEAR 1960 offers many challenges to the utility industry if we are to serve our industrial customers to help them achieve the all-important goal of Improved Productivity.

Everyone knows that much of our industrial plant is more than ten years old. Yet, if we are to increase productivity and take advantage of mod-

that two, three and even ten times the illumination previously considered as good will produce startling results in the form of increased productivity and improved quality.

Released during this year and available for intensive use during 1960 is the EEI "Fundamentals of Industrial Lighting" Course prepared to bring the story of better illumination to industrial plant personnel. To stimulate interest in better illumination direct mail material is available from EEI as well as from allies in industry. Work is in progress in cooperation with the Better Light, Better Sight Bureau in developing educational material which will help tell the story of Good Light.

The Industrial Electrification Council, composed of electric utilities and electric equipment manufacturers, working closely with the Industrial

Power and Heating Group, will hold its 4th National Industrial Electric Heating Conference designed to better equip utility power sales engineers to assist their customers in the proper use and application of electric heat in industry.

Other activities of the Industrial Electrification Council include a Metal Sheath Electric Heater Course designed for presentation to industrial plant representatives. In the process of development, also, is a course dealing with Industrial Electric Power Distribution and Electric Industrial Space and Comfort Heating. These should be available to meet the challenge of 1960.

Industrial air conditioning, in addition to good lighting, offers great potential for load building to the utility company and for increased productivity in the industrial plant. Here again,

our allies in manufacturing are cooperating in bringing this story of increased productivity to our industrial customers.

Improved materials handling, mechanization, industrial air conditioning and good illumination all join together to modernize our industrial plant, and as we in the utility industry are able to assist our industrial customers achieve the efficient use of these industry tools, we will be contributing to this nation's prosperity by helping to increase productivity. We cannot sit back and let the other fellow carry on the entire promotional job. By cooperation with our allies in the manufacturing industries which supply the electric utilization products we can all join hands for a better America and a better way of life.



- Key Problems, Challenges in '60**
1. Improving cooperative promotion activities
 2. Competing for share of consumer dollars
 3. Capitalizing on past promotion efforts

THE YEAR ahead could be the payoff year! In 1960 we should begin to reap the rewards of our extensive efforts to cultivate the residential market and turn its big potential into real sales results.

During the past five years there has been a healthy growth in cooperative programs aimed at persuading customers to enjoy more of the benefits of electrical living. Starting with the Live Better Electrically Program, all elements of the industry have continued to tie their individual efforts more closely

Residential Sales

"We are committed to even more thorough pre-selling of our prospective customers . . . while we capture for residential services a greater share of sales of all goods and services," says R. G. MacDonald, Chairman, EEI Residential Sales Group

with those of their allies. Today we look confidently to the intensified programs of organizations like NEMA, NECA, NAED, NAHB, and EEI. The total impact of the activities of these organizations, and others, definitely is arousing consumer awareness that "Electricity is your better way to . . ."

This united action by so many elements with common interests is stimulating still other groups. Publishers are an example. Many influential magazines with important circulations are now giving detailed editorial coverage to the whole range of modern electrical living.

In the electric home market, the many operating segments are coming to understand the aims of their allies. Today we find lending agencies, builders, contractors, manufacturers, distributors, and utilities combining their resources, knowledge, and efforts to offer the prospective home owner a truly better housing package. And this higher quality housing includes substantially improved wiring and a greater number of electrical applications built right into the package.

Electric home heating has brought still new allies into the field—signifi-

cantly, the coal industry and the insulation group, including glass.

Add to all this the new developments in lighting and other "bread and butter" lines like refrigeration—where two-temperature units are expanding an existing market in both old homes and new.

But this will not be a year in which to coast and "see what happens." 1960 will still call for a continuation—and improvement—of the activities of all associations and trade groups—plus well-planned promotion and selling by their individual members. We are committed to an even more thorough pre-selling of our prospective customers—since we are in an era of new shopping trends, in which a growing array of merchandise and services are spread out to compete for buyers' attention and dollars.

We have laid a solid groundwork, and now should begin to enjoy the payoff. This should come both as advances in our individual positions in the market, and in an upward move of our overall standing as we capture for residential services a greater share of the total sales of all goods and services to customers.



Key Problems, Challenges in '60

1. Recognizing broad responsibilities
2. Providing local, objective leadership
3. Fighting for order in industrial development

THE problems of GROWTH impose a real burden upon, and offer a golden opportunity to the electric companies of this country. Our concern with growth covers many aspects of our operation and of the economy. We are faced with the mixed blessings of:

Growth in population

Growth in numbers and dollars of payroll

Growth in fuel tax costs, materials

Area Development

"A campaign at the grass roots to educate, to direct and, when necessary, to lead in the field of area development is the challenge facing us in 1960 and in the years to follow," says Robert P. Lee, Chairman, EEI Area Development Committee

Growth in complexity of laws and regulations

Growth in housing densities and urban traffic problems

Growth in system capacity

Growth in demand and use of service

Growth in revenue

Growth in opportunity to do something about problems of growth.

The Area Development activities of electric companies in a majority of cases are principally concerned with achieving load growth through expansion and location of industries in or near the service area. This is a worthy objective and one which offers great possibilities for profit. Its long-term implications and its side-effects are not always all in the plus column.

The pattern and type of growth for any given location may well determine its value or detriment to the community. It is very easy to let nature take its course and create slums for tomorrow from the development of today. It is in the recognition of the broad view and responsibility for sound Area Development that our companies face a real challenge and an opportunity.

Consideration of the need for planned, intelligent, orderly growth

has led to supporting activities in community and regional planning, improved zoning, urban renewal, recreational and educational development. Local responsible leadership, so much in demand and so lacking in many areas, can, and must, be furnished by men with objective viewpoint. Politicians — mayors, selectmen, governors and even congressmen, campaign for office on platforms containing planks dedicated to bigger and better industrial development. State, county and municipal commissions promote, advertise, travel and violently vie for plant locations in their areas.

It is truly reaching the proportions of a mad scramble with an estimated 10,000 organizations listed as industrial development agencies of various types. We can afford to stand back and take a look; to study the real needs for healthy growth in our areas and then quietly, effectively fight for some order in the growing chaos of industrial development activities.

A campaign at the grass roots to educate, to direct, and when possible and necessary, to lead, in the field of area development is the challenge facing us in 1960 and in future years.



Power Survey

"The resumption of the normal rate of annual load growth is at hand, following 'off-course' trends of recent years, and the margins between peak loads and system capabilities should be closed to somewhat lower values in the years ahead,"

PERHAPS the most significant finding of Edison Electric Institute's 26th semi-annual electric power survey made as of October 1, 1959, is the fact that on a collective basis, the peak load forecasts for the periods ahead agree almost exactly with the forecasts submitted at the time of the 25th semi-annual survey of last April. And why is this significant?

In general, the look-ahead in the fall

of 1954 and the spring of 1955 foresaw peak loads for the coming years increasing at fairly normal rates. Later in 1955 and through 1956 the composite of forecasts submitted by the power systems showed increases over estimates.

Reflecting this increase in the previously expected rate of load growth, there was a considerable increase in the number of new power projects scheduled. Along with this, of course,

Purchasing and Stores

"The challenge today and in the future, is to conceive, design and promote methods, systems and techniques . . . in which the cost is in proper proportion to the benefits obtained," says H. T. Simpson, Chairman, EEI Purchasing and Stores Committee

able progress will be made toward a greater adaptation of these techniques in our Purchasing and Stores operation.

Value Analysis is an analytical procedure for objectively studying every item to be purchased—standard or special—and eliminate every cost factor which does not contribute to the value or usefulness of the item. In this procedure perhaps the most significant aspect is the increasingly important role Purchasing may be assigned in a determination of what to buy. Purchasing managers have shown they have the facility in value analysis techniques to demonstrate cost reduction and improvement of a company's profit position.

Electronic Data Processing, it is expected, will receive an ever increasing application in the area of material control. Initially it was only the larger companies that could justify adoption of these machines, but recently machines of one kind or another may soon be within the reach and means of many more companies. These marvelous machines offer untapped opportunities for a more effective means of material control.

Containerization ties in very definitely to the Standard Packaging effort of the Purchasing and Stores Committee of the Edison Electric Institute.

Material handling costs are closely concerned with the package or container which we receive, store and from which the material is disbursed. If it is too large, too heavy or of improper construction serious problems arise. Lacking standards it is necessary to improvise with almost every receipt. The containers may not fit the pallet properly; piling in the warehouse becomes a conglomeration of various size containers for a given commodity; the quantities in each package may be ill-chosen; or lack the strength to stack as high as we have room to go.

In manufacturing plants, in jobber's warehouses and in our own warehouses the principal assignments of our labor forces are in the handling of packaged elements. Associated with the high labor costs in the warehouse operation are the overhead costs of material handling equipment and systems. Together these costs are substantial and a fertile area for cutting costs and so it is quite natural that our industry members can be expected to assign Cartonization high priority in 1960.

Finally, the challenge today and in the future, is to conceive, design, and promote—methods, systems, and techniques—in which the cost is in proper proportion to the benefits obtained.

Key Problems, Challenges in '60

1. Using "value analysis" in buying
2. Material control by data processing
3. Cutting costs in packaging

PURCHASING and Stores Managers are ever seeking to move ahead by keeping abreast of current conditions and looking ahead for opportunities to a continuing program of cost reductions. This is accomplished by searching out lower costs of purchased materials and introducing cost saving techniques in material control and material handling.

Broad indicators point to at least three areas for improvement and economic accomplishment:

1. Value Analysis;
2. Electronic Data Processing in material control; and
3. Containerization.

It is predicted that in 1960 consider-

says A. S. Griswold, Chairman, EEI Power Survey Committee

there was a considerable increase in the amount of heavy power equipment placed on order.

The survey of April 1957, however, showed a slight reduction in the peak load forecast for that year and for each of the following three years. This was the forerunner of the recession in business activity which became more clearly evident later in 1957.

In subsequent semi-annual surveys, up to and including the survey of April 1959, there was a succession of reductions in load forecasts, but in each case the annual rate of load growth shown

by the forecasts remained about the same. This meant that as foreseen, the future rate of load growth would be about normal, but the time of return to that rate was being delayed.

The fact, then, that the forecasts of last October were the same as those of last April is taken to indicate that the resumption of the normal rate of annual load growth is at hand. Or, we may say that the future load estimates have become stabilized.

Meanwhile, the enlarged program of expansion of generating facilities undertaken prior to 1957 has been mov-

ing steadily forward with the result that the margins between peak loads and system capabilities have been widened beyond original expectation.

The closing of these margins to somewhat lower values will be accomplished in the years ahead as loads resume their expected annual rate of growth following the "off-course" trends of the years just passed.

Thus, the present look-ahead seems to show a more normal course during the coming years with yearly increases in power requirements consistent with previous expectations.



1. Understanding emotional causes for human mistakes
2. Developing better protective equipment
3. Developing safer construction standards

TWO YEARS AGO the chairman of the EEI Accident Prevention Committee (I. R. Dohr) listed seven projects requiring attention:

1. Establish better communications with all levels of management in order to keep them informed of accident prevention progress and to indicate how management might best support the safety effort;

2. Develop uniform safe working

ATOMIC power development still remains one of the most challenging opportunities the utility industry faces.

The program for nuclear power development in the U. S., to which electric power companies have been and are making a major contribution, has been progressing at a rate which is both substantial and adequate on the basis of all domestic considerations.

During the past few years we have witnessed important progress in the field of atomic power development. Our industry's efforts—represented by 16 nuclear power plant construction projects—have been helpful in this progress. In the next few years we will obtain additional useful experience from the operation of the large utility



Accident Prevention

"The toughest challenge is . . . reaching deep into men's minds, of holding workers' attention alert as they perform their duties, driving home the importance of living safely," says A. J. Naquin, Chairman, EEI Accident Prevention Committee

practices for the industry;

3. Produce a greater number of effective safety training visual aids;

4. Produce a monthly safety package of safety materials—posters, leaflets and crew foreman's letters;

5. Study the new and rapidly developing area of nuclear power plant safety;

6. Search for more effective methods for resuscitating victims of electric shock, and;

7. Help organize a national campaign to prevent accidental electric shock to non-utility employees.

Based on reports made at a meeting of the Accident Prevention Committee in November, 1959, by twenty subcommittees and one task force, substantial and even spectacular progress has been made on all of the above projects with the exception of number 7. In addition, a study has been

instituted to develop safe working practices for aerial automotive equipment.

The field of accidental injury prevention in the electric utility industry will continue to deal largely with physical and material things like safeguarding energized equipment, developing better climbing equipment, developing better and more diverse protective equipment (such as rubber goods and hot-line tools), and developing safer standards of construction including grounding. A new safety frontier, however, is coming more and more into focus as we endeavor to distinguish and understand the emotional and psychological causes of human mistakes and human action which result in accidental mishaps and which, apparently, are the underlying cause of the vast majority of employee injuries.

It is the toughest challenge we face today.

Atomic Power

"Atomic power development can be most successful if it is accomplished as soon as possible . . . and within the framework of commercial development of conventional energy sources," says Elmer L. Lindseth, Chairman, EEI Atomic Power Committee

power reactor plants now in the final stages of construction.

Atomic power development will continue to be expensive. We must, therefore, emphasize a vigorous and orderly program of nuclear power research, development and construction consistent with unfolding technological developments. We should use prototype plants to demonstrate the feasibility and cost merit of new concepts and then, and only then, build large-scale plants if there is a reasonable assurance that competitive power can be produced from these large-scale plants. Such reasonable assurances should not depend on excessive extrapolation from prototype plants or assumptions not in accord with good utility operating practices. Our main concern is and will be atomic knowledge, not atomic kilowatts.

In all probability we cannot continue a program too broad in scope as to slow down our actual progress. However, we should not go to the other extreme and concentrate on any one reactor concept because the extent of our present technology does not indicate that any one concept is vastly superior to all others. We must choose a path somewhere in the middle of these opposite extremes and be selective in the reactor concepts we choose.

As in the past, atomic power development will have the attention and participation of the best minds in our industry in 1960. Our industry's resources of money, manpower and experience are pledged to the fullest extent possible to bring about the successful development of competitive atomic power.

Underreamer Device Digs Footing Holes

Public Service of Colorado is now using an underreamer device to facilitate tower footing construction. The reamer is bottomed into a previously-augered 30-in.-diam., 12-ft-deep hole.

Down pressure on the device makes its blades expand as it turns, undercutting a larger hole back toward the surface of the earth. Result is a pear-shaped hole having a 30-in.-diam. stem and a five-ft-diam. bottom end.

Tower legs are placed in these pear-shaped holes which have been reinforced with steel rods. Then concrete is poured.

The underreamer attachment is being used on the Transmission Line Dept.'s D-4 Caterpillar tractor. This tractor is also equipped to handle an earth boring device, bulldozer blade, special winch, and 20-, 24-, and 30-in. augers.

NOPSI Splits Its Dual Network

Early this year, New Orleans Public Service's dual a-c underground network will be split into four separate networks.

Twelve new 13.8-kv circuits will originate from an existing substation and will pick up existing cables at feed points in the newly-created networks. Installation of these new circuits began early last summer, and was completed in October.

Six of the new circuits consist of single-conductor, paper-insulated, lead-covered 3.4-in.-diam. cables installed in ducts. The other six circuits consist of mostly 500-mcm, paper-insulated, lead-covered cable which has a polyethylene jacket over the lead to furnish protection from mechanical damage and corrosion.

Pulling crews install the cable in duct runs of from 300 to 485 ft between manholes. Cable ends are sealed with solder as a temporary protection against moisture until cable splicers can join the short runs between manholes.

Too Many Instruments No Good

An oversupply of complex instruments, instead of safety and efficiency provisions in boiler operations, may be paving the way for major catastrophes, M. L. Jones, principal power engineer for E. I. du Pont de Nemours and Co., Inc., told a recent Annual ASME meeting.

There's nothing wrong with the instruments, which provide controls for the boilers and indications as to what's going on inside, he said, but "a sometimes oversold, highly instrumentized boiler frequently results in a management decision that no operator is required or that the unit can be maintained by anyone regardless of qualification."

In the present absence of a code for operational procedure, Mr. Jones suggested the following:

1. Proper balance between automatic operation and qualified human supervision should be maintained, so that a highly trained man does not find himself nursing a set of gauges or a boiler operator called on to be responsible for the interpretation of a set of complex instruments.

2. Instruments should be completely suited to the boiler. Flame failure, or interruption of the flame in the furnace, for example, is a major contributor to furnace explosions, but it is very difficult to detect properly. From among the many different units available, the power engineer must select the type best suited to burner design, furnace design, number of burners, type of fuel and arrangement.

Wisconsin PS To Use Microwave Relaying

Wisconsin Public Service recently completed installing transmitting and receiving equipment of a microwave protective relaying system linking its Pulliam plant and its Washington St. substation. When installation of protective relaying has been completed, probably early this year, the system should be ready for operation.

Public Service will then be the first utility in Wisconsin to use microwave.

Hall Effect Transduces Watts

The Hall multiplier — a new watt-measuring device — developed by Westinghouse, now serves as a watt transducer, where it converts a-c watts to a d-c millivolt signal.

Watt transducers supply a signal, proportional to measured watts, for application to a control device, or to a telemetering transmitter. Speed of response is in microseconds.

Two versions have been designed: the first produces an unfiltered d-c current output in the milliamperage range and is used for driving direct-acting external instruments, or control windings of magnetic amplifiers, where there is no sensitivity to a-c ripple. The second produces a filtered d-c millivolt output and is applied where control devices, telemetering transmitters, or potentiometric recorders must have a d-c signal relatively free of ripple.

VEPCO Installs System Computer

An electronic computer, designed to control instantaneously the system-wide electrical generation of Virginia Electric and Power, has been installed at Vepco's system operator's office at Richmond.

The computer and its associated equipment, costing about \$125,000, will save the company an estimated \$60,000 annually in the cost of generating and transmitting power.

DIGITAL COMPUTER ENHANCES DISTRIBUTION SYSTEM CONTROL

By G. P. RHOTEN,
Senior Design Engineer,
Texas Electric Service Company

Because of its ability to handle large masses of data at a small fraction of the cost of manual work, the digital computer's application to distribution problems is limited only by imagination and tenacity of the distribution engineer.

TODAY, DISTRIBUTION MANAGEMENT is challenged by the increasing severity of old chronic problems and by new acute problems related to rapid growth, changing load characteristics, and rising costs of both manpower and materials. Inherently, distribution problems are difficult because distribution is a "nickel and dime" business. Virtually all of the more difficult problems have to do with that majority of distribution plant composed of literally millions of pieces and parts. The one thing which is common to all of these more difficult problems is the lack of complete and current data from which studies and judicious decisions can be made.

In Texas Electric Service Company the problem of maintaining a balanced load between phases of the 12.5 kv feeders became so acute by 1955 that it was obvious that a new and better corrective method must be found. The old way of going to the field and adding up transformer name-plate kva by phases, junction by junction, and measuring phase currents was no longer either feasible or effective. The situation annually became worse; balancing cost increased while effectiveness decreased. Annual cost of this balancing work had reached nearly \$6,000 in the Fort Worth District where there were approximately 50 feeders. Existing manpower permitted time only for

work on the few feeders where the unbalance was very severe.

During this period of rapid growth it became increasingly difficult to analyze each feeder in advance of annual budget preparations to determine voltage drops, fault currents, line losses and other conditions pertinent to budget decisions. Past practices of manually accumulating connected transformer nameplate kva, aligning in proper electrical sequence, and wading through the rigorous manipulations and slide rule calculations were beginning to bog down such that many answers were out of date before they were available.

Another problem (of which we were most unhappily made aware) concerned service continuity performance of the system. Certain customers with critical load requirements complained (quite correctly as was later determined) of an unsatisfactory interruption history. Extensive research revealed that this was caused by various unrelated cases of trouble. We had been blissfully unaware that our half-century old method of recording service interruptions was entirely inadequate for today's modern loads served by a complicated distribution system. Regardless of the high cost of recording, tabulating, summarizing, and analyzing service interruptions, very little was known about the actual performance of individual elements of the distribution system.

Having realized continuous success



Fig. 9—Structural representation of the company's general program which starts at the customer's meter and proceeds in correct electrical sequence to the substation.

since 1953 in the application of data processing equipment to the company's annual transformer load study, a survey was made to determine feasibility of using a modern digital computer to solve some of these other pressing problems. In reviewing programs being used by others in industry, it seemed that there was one glaring mistake common to all. Each program had been developed to solve one specific problem without regard for kindred problems requiring inter-related data or procedures.

The best solution to the overall problem, it became evident, was a general program having different parts for solution of specific problems. Pursuing this, the first step was to set up a grid on an X and Y axis such that any element or point on the system could be uniquely identified as well as located or "addressed" to within 10 feet by a 10-digit coordinate number. Fig. 1 shows this overall grid which has been superimposed on detail distribution maps.

The next step was to divide each feeder into logical small increments by marking on a feeder map such pertinent points as conductor size changes, major junctions, changes in the number of phases, large loads, certain critical customers, regulators, and large capacitor banks. This resulted in the

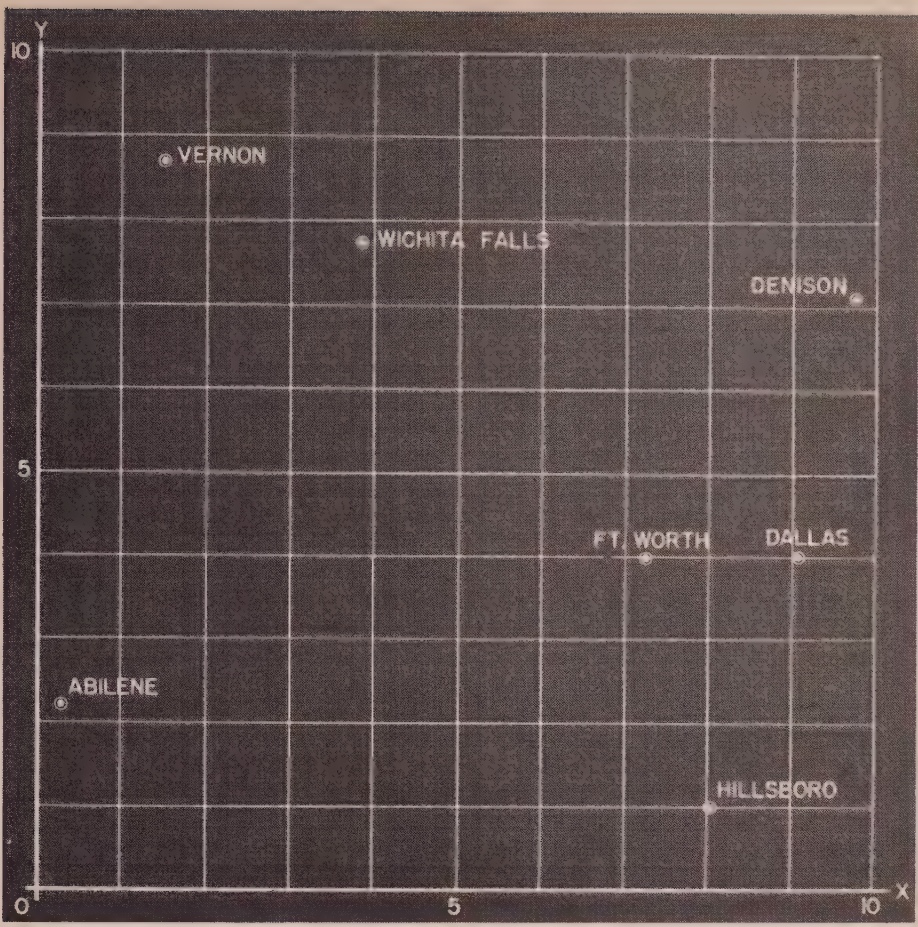


Fig. 1—Any element or point on the distribution system can be identified, located, or "addressed" to within ten feet by this grid which has been superimposed on detail distribution maps.

average feeder being divided into approximately 150 line sections. Fig. 2 is a map of a fairly simple feeder divided into line sections by the various pertinent points, each of these points being identified by its coordinate number. Each line section is identified by coordinates of its end point farthest away from the source. On the actual feeder map all lines are identified as to phase.

At this stage, the company secured the services of the Computer Research Center at Texas A and M College and, in cooperation with them, set out to design a computer program to produce a phase balancing report. This program was designed to use data in the form of one punched card for each line section and one card for each spot load. One of these line section cards is shown in Fig. 3. Notice that in addition to feeder number and line section number, this card also contains the next line section number. This enables the computer to align all line section cards for one feeder in their proper electrical sequence, eliminating the necessity of manual realignment as circuit feeds are changed.

Realizing further possible use of this

card, a conductor code was also punched into it, this particular example being coded three-conductor copper No. 4. The card also contains space for name-plate kva by phases which will be punched into the card automatically by the machine program.

Another step in preparing necessary data was to punch one card for each individual transformer. Fig. 4 shows one of these transformer cards. Note that, in addition to vital statistics of the transformer on the left hand half

of the card, feeder number and line section number are shown. All transformers in this line section have the same line section number. In addition, the name-plate kva per phase is shown and there is a transformer location number. This number is the coordinates of the pole on which this transformer is installed.

Processing Data

The first step in the program was to total up on a simple accounting machine the connected name-plate kva, by phases, for all transformers within each line section and automatically punch that kva into the line section card. The main part of the program used the line section cards as data and produced a phase balance report. A part of this report for feeder No. 75 is shown in Fig. 5. The first column is the feeder number and the second column is the electrical sequence number produced by the machine program. Columns three and four are the X and Y coordinates of the line section number. Next is shown the kva total and by phases for each line section. Notice also that sub totals are shown for junctions and farther to the right are sub totals for the major junctions. Since this is the last part of the report for this feeder, the last line shows the totals for the whole feeder.

This report is used in two ways. First, from this report and the associated feeder map, an engineer can determine, without expensive and time consuming field work, the phase connection changes necessary to balance

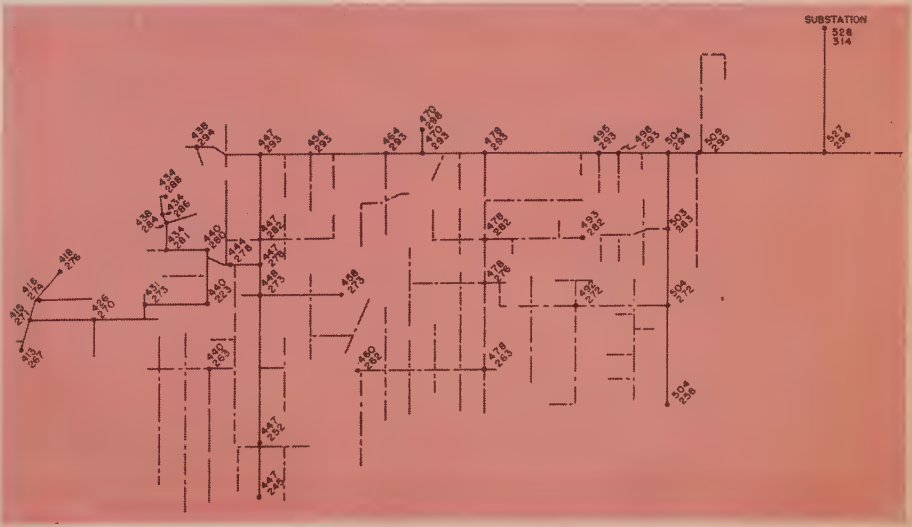


Fig. 2—Map of feeder No. 75 divided into line sections by various pertinent points, each being identified by its coordinate number.

[illegible]

Fig. 3—Line section cards contain feeder number, line section number, and number of next line section so that computer can align cards for one feeder in their proper electrical sequence; also included are conductor code and space for name-plate kva by phases.

[illegible]

the kva between phases. Second, day by day, as additional transformers are installed, an engineer determines the correct phase to which they shall be connected in order to maintain phase balance. It is obvious that after using this report for a reasonable period of time corrective work will become unnecessary.

To complete data necessary for other uses, distances were also punched into these line section cards and, again in cooperation with the Computer Research Center, a program for feeder analysis was prepared, including calculation of voltage drops, line losses and other information necessary for preparation of the annual construction budget.

Fig. 6 shows a part of the feeder analysis report for this same feeder No. 75. The left hand part of the report shows feeder number, sequence number, and line section number as was shown on the phase balance report. The next columns give conductor code and

percent design limit to which the conductor is loaded. Only sections loaded above 100 percent design limit are printed out on the report. The next column gives voltage drop in percent from the substation to the point involved, and the next shows voltage drop within the line section involved. The person reading this machine-printed report must be able to correctly

place the decimal point in each column since the machine does not print decimals. The next column shows kva load beyond the point involved, and the next column, corrected power factor of that load. The last column gives line losses within each line section, with total line losses for the whole feeder at the bottom.

Using this report, an engineer consumed two weeks in preparation of the annual construction budget for the 50 feeders involved. By comparison, a small area of only five feeders for which this machine report was not available, required two weeks of an engineer's time for the same budget work.

The cost of producing these two programs was \$1800. The cost of running both programs in 1958 for all 50 feeders and printing out the two reports was \$1160.

Broaden Applications

Since these programs were first prepared, it has been decided to make certain improvements. First, fault current calculations will be included. A further improvement, the computer will calculate distances by using coordinates of line section points. Also, as these programs are revised, they will be combined with other programs into one general program having several parts such that any one part can be run separately. This is desirable, since some reports will be required monthly, while others will be needed annually.

The same line section cards containing basic data for these two programs were also used by two other programs involving faults and interruptions. A program which produces a report of

REPORT OF MAJOR TROUBLE		MONTH		YEAR		DAY		TIME		REPORT NUMBER	
		203		9		3		59		21	
REASON FOR MAJOR TROUBLE		1 - Clouds		4 - Elec. Storm		7 - Blizzards		10 - Weather map not available		11 - Second digit for other meteorological conditions	
2 - Rain		5 - Wind Storm		8 - Ice Glaze		9 - Turbulence		12 - Third digit for severity of first 3 categories		13 - 2nd, 3rd, 4th	
3 - Fog		6 - Dust Storm		9 - Thunder							
5		2		3		4		5		6	
7		5		7		5		0		4	
3		2		8		3		0		1	
1		2		8		3		0		1	
2		8		3		0		1			
3		2		8		3		0		1	
4		2		8		3		0		1	
5		2		8		3		0		1	
6		2		8		3		0		1	
7		2		8		3		0		1	
8		2		8		3		0		1	
9		2		8		3		0		1	
0		2		8		3		0		1	
1		2		8		3		0		1	
2		2		8		3		0		1	
3		2		8		3		0		1	
4		2		8		3		0		1	
5		2		8		3		0		1	
6		2		8		3		0		1	
7		2		8		3		0		1	
8		2		8		3		0		1	
9		2		8		3		0		1	
0		2		8		3		0		1	
1		2		8		3		0		1	
2		2		8		3		0		1	
3		2		8		3		0		1	
4		2		8		3		0		1	
5		2		8		3		0		1	
6		2		8		3		0		1	
7		2		8		3		0		1	
8		2		8		3		0		1	
9		2		8		3		0		1	
0		2		8		3		0		1	
1		2		8		3		0		1	
2		2		8		3		0		1	
3		2		8		3		0		1	
4		2		8		3		0		1	
5		2		8		3		0		1	
6		2		8		3		0		1	
7		2		8		3		0		1	
8		2		8		3		0		1	
9		2		8		3		0		1	
0		2		8		3		0		1	
1		2		8		3		0		1	
2		2		8		3		0		1	
3		2		8		3		0		1	
4		2		8		3		0		1	
5		2		8		3		0		1	
6		2		8		3		0		1	
7		2		8		3		0		1	
8		2		8		3		0		1	
9		2		8		3		0		1	
0		2		8		3		0		1	
1		2		8		3		0		1	
2		2									

interruptions to certain customers has been completed and is now ready for use. Another program for producing periodic statistical summaries of faults and interruptions is being prepared but is not yet complete.

Data for both of these programs related to faults and interruptions will come from the same sources. Fig. 7 is a report of major trouble. This form was specifically designed as a source document for key punching data into a card. The form provides for general information, interruption data, fault data and miscellaneous information. The feeder number and the line section number provide information for the sequential alignment or "tracking" part of the general program to accumulate customers just as it accumulated kva. Other data pertinent to the fault or interruption is coded into this form.

This punched card together with the line section cards and one punched card for each of the preselected certain customers make up the input data for both programs related to faults and interruptions.

Fig. 8 is part of a machine-produced report of interruptions to certain customers whose interruption history has exceeded certain arbitrary maximums. The report shows number of instantaneous interruptions, number of persistent interruptions, and number of minutes involved in these persistent interruptions for the past month and year. Although the program compiles this same information for each of the "certain customers," printed out on the report are only those whose interruption history exceeds one of the certain arbitrary maximums.

It is expected that periodic statistical summaries which will be produced from coded trouble reports will reveal useful factual data, heretofore unavailable, which will result in better and more economical operation of the distribution system.

In addition to the general program's major parts which have been discussed, various other useful reports are provided. A reserve transformer report, by districts, showing total quantities by various categories is produced monthly from transformer cards. This report is a valuable tool for monitoring transformer stocks and purchases. Various bulky annual reports can also be prepared economically and accurately.

The one other source of data which has not been specifically mentioned

(Continued on page 65)

Fdr. No.	Seq. No.	Line Sec. Number		Tot.	A	B	C	Tot.	A	B	C
75	39	478	282	25	25						
75				25	25						
75								60	30	30	
75								6830	2253	2510	2065
75	40	478	293	80	15	30	35				
75	41	495	293	80	25	25	30				
75	42	498	293	25		25					
75				185	40	80	65				
75	43	504	256	215	75	25	115				
75				215	75	25	115				
75	44	492	2729	320							
75	45	492	272	192							
75				512			512				
75								727	75	25	627
75								727	75	25	627
75	46	504	272	77	62		15				
75	47	503	2839	130	55	75					
75	48	503	283	105		105					
75				312	117	180	15				
75								497	157	260	80
75								8054	2485	2795	2772
75	49	504	294	150	65		85				
75	50	509	2959	130	75		55				
75	51	509	295	60		25	35				
75	52	527	2949	75	40	35					
75	53	527	294								
75				415	180	60	175				
75											
75											
75	55	528	3149								
75											
75								415	180	60	175
75								8469	2665	2855	2947

Fig. 5—Part of the phase balance report for feeder No. 75.

Fig. 6—Part of the feeder analysis report for feeder No. 75.

Fdr. No.	Seq. No.	Line Sec. Number		Wire Code	% Load	Percent				Losses Kw x 100
						Volts Tot.	Drop Incr.	Kva Unc.	PF	
75	39	478	282			347	27	765	76	215
75	40	478	293			320	64	5843	95	2107
75	41	495	293			256	12	5911	95	382
75	42	498	293			244	27	5956	95	907
75	43	504	256			253	3	92	76	3
75	45	492	272	1204	117	280	30	354	76	108
75	46	504	272			250	14	651	76	84
75	48	503	283			236	19	839	76	139
75	49	504	294	3120	117	217	24	6913	93	916
75	51	509	295	3120	120	193	90	7114	92	3524
75	53	527	294	3120	122	103	103	7203	92	4029
75										19116

Fig. 8—Part of a machine-produced report of interruptions to "certain" customers whose service interruption history has exceeded arbitrary maximums.

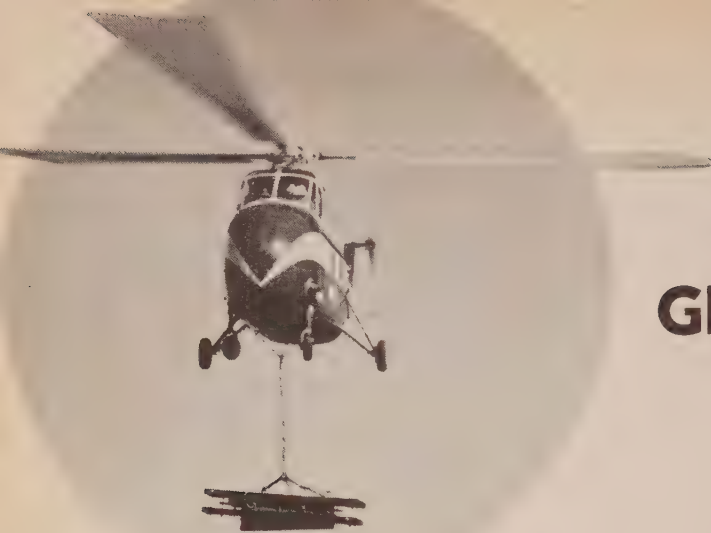
REPORT OF INTERRUPTIONS TO CERTAIN CUSTOMERS FOR ONE YEAR ENDING JULY 31, 1959							
Name	Past Month			Past Year			Feeder Number
	No. Inst.	No. Pers.	Tot. Min.	No. Inst.	No. Pers.	Tot. Min.	
Apex Steel Co.	7	1	38	50	5	213	75
Calumet Bakery	5	2	112	18	6	92	102
Fogg Grain Co.	9	1	15	32	3	123	63

HELICOPTERS

HELP BUILD 12-kv

GRAND CANYON LINE

Helicopters have helped Arizona Public Service build a 12-kv line deeply into the Grand Canyon with minimum scenery disturbance.



Materials for a transformer platform for the 12-kv line are flown into Indian Gardens without trouble.

A GAIN, FLEXIBLE CONSTRUCTION operation which is permitted by helicopters has paid off in line construction benefits under adverse terrain conditions. Arizona Public Service drew heavily on the helicopter's talent in the construction of a two and one-half-mile, 12-kv line from Maricopa Point on the South Rim of Arizona's Grand Canyon to Indian Gardens, more than 3000 ft down in the inner recesses of the world-famous gorge.

Perhaps the most remarkable thing about the line is that it is engineered and constructed in such a way that it is not visible from any scenic viewpoint on the Canyon Rim. It replaces an old 2.4-kv cable which served the water pumping station at Indian Gardens. Electric pumps at this location lift water to Grand Canyon Village on the South Rim.

When it was apparent that the old

cable could not take another severe winter without breakdown, discussions were held between the company and Park Service officials to determine the best possible way to replace the line.

Two muleback trips into the gorge by engineers, surveyors and right-of-way specialists were made. On the second trip, a route was selected and staked on a tentative basis. One important criterion was a dark background for each pole—none to be sky-lighted.

Helicopters were used to haul in the line construction materials since this would eliminate the need for construction of an overhead tramway in scenic areas for the moving of materials into the Canyon. The helicopter also eliminated the need for building additional trails and roads into the gorge.

Black, creosote-treated poles and standard single crossarms were used in the job. Three pole structures are used to support two of the longer spans. One of these spans measures 3060 ft



Most ticklish phase of the work was placing the transformers at Indian Gardens. Transformer weight necessitated removal of the oil before the drops were made. Workmen then were flown in with oil drums to pump oil back into the transformers.

horizontally and the space between ground and line at one point measures 1789 ft vertically. The line cost \$50,000.

Before the choppers began hauling in material, Park Service approval had to be obtained. At each pole location, 35-millimeter color photos were taken. On completion of the tentative route plan, Harold Taylor, job engineer for Public Service, selected slides of each pole location and made a tape recording for presentation to the Park Service, along with construction drawings and maps.

Effectiveness of the presentation was demonstrated by the fact that the government agency accepted the proposed route and technique without change.

Helicopters used in the operation are owned by Utility Helicopters, Inc., Long Beach, California, and PDQ Airways, Phoenix. Utility Helicopters supplied a Sikorsky S-55B. Smaller choppers from PDQ were used to move workmen and small equipment.

Late afternoon shadows added to job hazards, but all drops were completed successfully and without incident. Materials were placed at 21 separate locations.



Following Park Service approval, Jack Hall, left, Arizona Public Service construction supervisor and Harold Taylor, job engineer, discuss final details prior to launching of the two-day airlift of materials in Grand Canyon. The company also uses helicopters for line patrol.



Most precarious location on the line route is Red Point. It drops off some 2000 ft into one of the many gorges within the Canyon. Pole is held up close to the Sikorsky S-55B's fuselage and is ready for lowering.



RADIOGRAPHY CHECKS WELDS IN PIPE-TYPE CABLE LINES

Photography via gamma rays proves to be superior to the pressure method of inspection and testing, speeding up processes of applying Somastic molds at welds, backfilling trenches and restoring pavement.

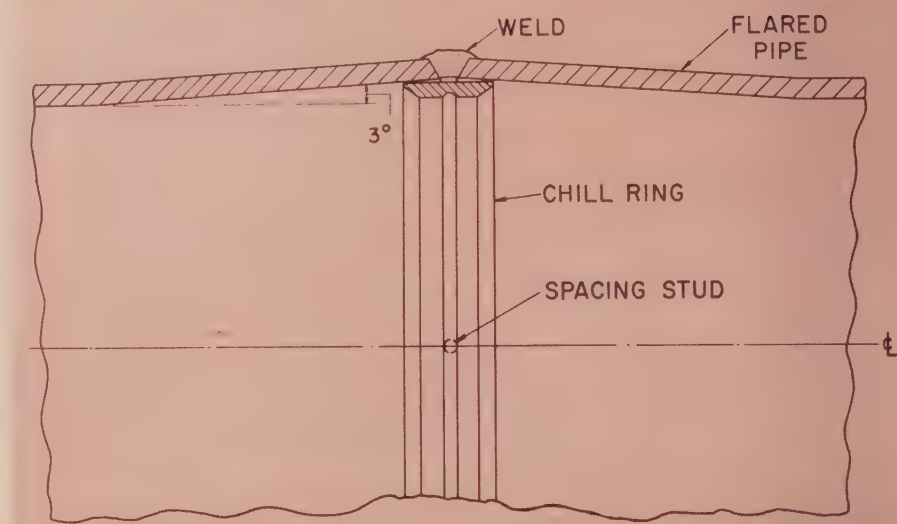
By **HOWARD L. DAVIS, JR.**

*Engineer-in-Charge, T&D Section,
Electrical Engineering Division
Philadelphia Electric Company*

APPPLICATION OF X-RAY photography to the construction of high pressure pipe-type cable lines on the Philadelphia Electric Company system began about three years ago. Since that time, 13 lines have been installed consisting of approximately 91,000 ft of pipe. Construction of these lines required examination of about 2500 welds with X-ray photography. To date, no defects have developed in welds approved by this inspection method.

Prior to adopting this new method, welds were pressure tested at 500 lb. Because it was expedient, these tests were made on manhole to manhole sections of pipe. This required maintaining a bell hole at each weld and testing in a water bath with the line under pressure. Pipe used in these lines is coated with Somastic and molds at welds could not be applied until after the pressure test.

While the pressure test method of examining welds was satisfactory from a quality standpoint, it had the disadvantages of requiring extensive ditch maintenance and retarding street restoration. Local residents were often inconvenienced and public relations suffered. These undesirable features are eliminated by the new method which permits examination as soon as the weld is sufficiently cooled, and application of the Somastic mold when the weld is approved. Thus, trench maintenance is reduced; backfilling and res-



toration of pavement are expedited.

Two Approaches

Welds on pipe that will contain cables are completely X-rayed using three films exposed at intervals of 120 degrees. A complete analysis is made because unless detected during construction a leak will not be discovered until the manhole section is cleaned and evacuated. This normally follows paving restoration and cost of repairs would therefore be extremely high. Furthermore, it is conceivable that a leak could exist that would not be detected by the vacuum test but would show up after the cable is installed and the line is filled with oil. Such a leak would be difficult to locate.

For welds in piping that does not contain cable, such as oil supply lines, only two X-ray photographs are taken with film exposures at quadrature. This includes about 60 percent of the welded joint. Partial X-ray analysis is justifiable in this case since this piping is normally installed on company property, usually in short lengths, and it is less costly to repair.

X-Rays vs. Gamma Rays

Basically, radiography involves a

Fig. 1—Typical cross-section of line pipe weld used in the construction of pipe-type cable.

photographic negative and source capable of producing radiation which penetrates the object under examination and exposes the negative. This can be done with radiation either from a high voltage electronic X-ray generator or from radioactive isotopes. The X-ray generator is a bulky device and weighs 20 lb or more whereas the isotope is a small quantity of radioactive material that is forced either mechanically or with compressed air from a suitable storage container to a chamber about two inches in diameter mounted on the object to be examined. The isotope currently used by the X-ray companies on Philadelphia Electric Company projects is Iridium 192 which produces gamma rays.

These two techniques differ widely in the latitude or degree of contrast of the exposed negative. The gamma radiation from Iridium 192 has a shorter wave length than X-rays and hence has greater latitude. If, for example, it is desired to examine an object with large variations in thickness, the use of X-rays is unsatisfactory because the intensity required to penetrate the thick-

Editor's Note—This is the essential text of a paper presented by the author at the October 1959 meeting of the Transmission and Distribution Committee, Edison Electric Institute.

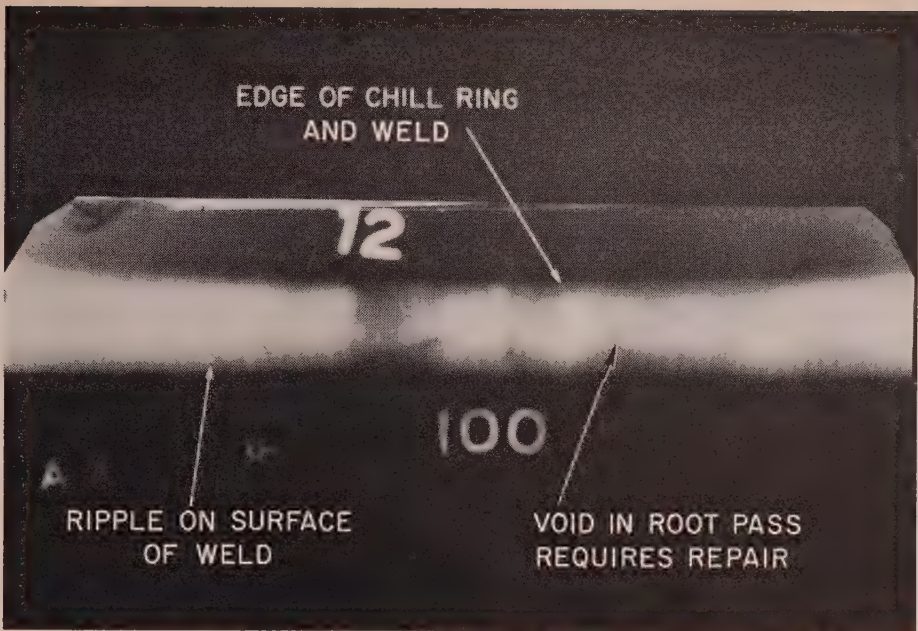


Fig. 2—X-ray photograph of a pipe-type cable weld containing a defect.

er portions of the object over-exposes the negative in the areas of the thinner portions. Gamma rays with their greater latitude give various shades of grey which are more readable. However, the high contrast obtained with X-rays makes minute inclusions and flaws more readily discernible in specimens of uniform thickness, such as the butt welds between lengths of line pipe.

Fig. 1 shows a typical weld assembly for pipe-type cable. Pipe ends are flared prior to delivery to the field. A chill ring is used to back the weld area and exclude weld material from the inside of the pipe. The chill ring also contains spacing studs for proper separation of the pipe ends. The pipe ends are butted against the spacing studs. A photograph of a chill ring weld made with X-rays shows only the chill ring area due to the variations in metal thickness. An example of such a photograph containing a defect is shown in Fig. 2.

Recognizing Defects

The film consists of a 10-in. by 3 1/4-in. photographic negative. The weld area and chill ring show up as a light band on the negative. The sharp edge of the weld area seen in some sections of the negative is where the chill ring extends slightly beyond the weld. The narrower band extending along the center of the weld is the first or root pass. The wavy lines running perpendicular to the weld are caused by the ripple on the surface of the finished weld. The dark area on both sides of the weld is the parent metal of the pipe.

The defect in this weld is the darker U-shaped spot on the right side of the

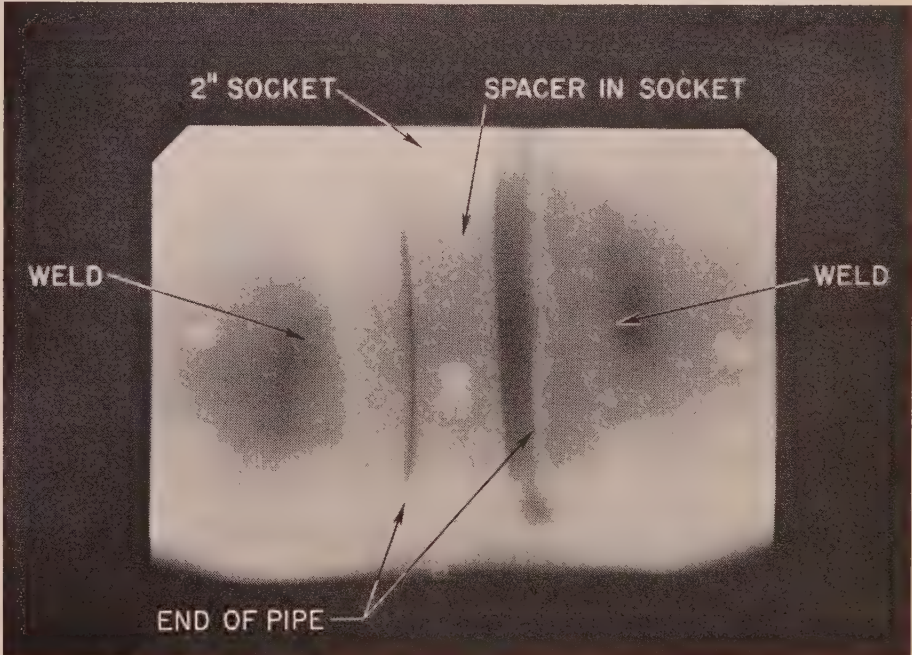


Fig. 3—Photograph of two-in. socket weld made with isotope Iridium 192.

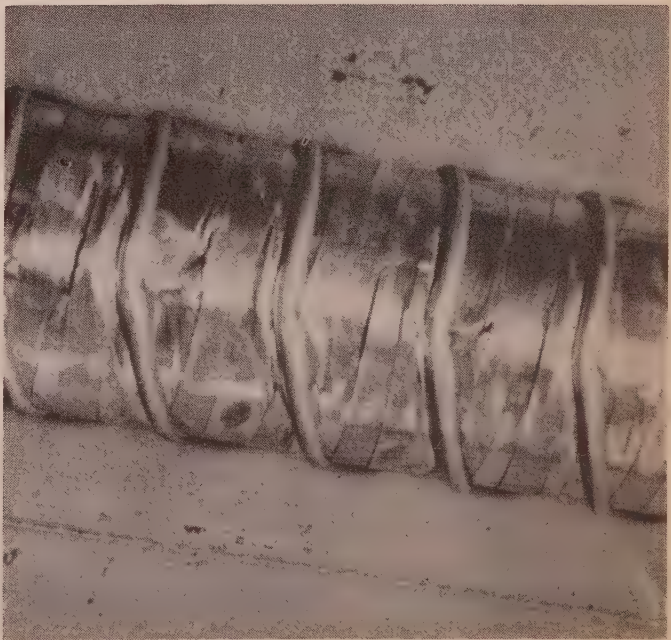


Fig. 4—Insulation damage and bent skid wires of this 138-kv cable are result of sharp obstruction in pipe.

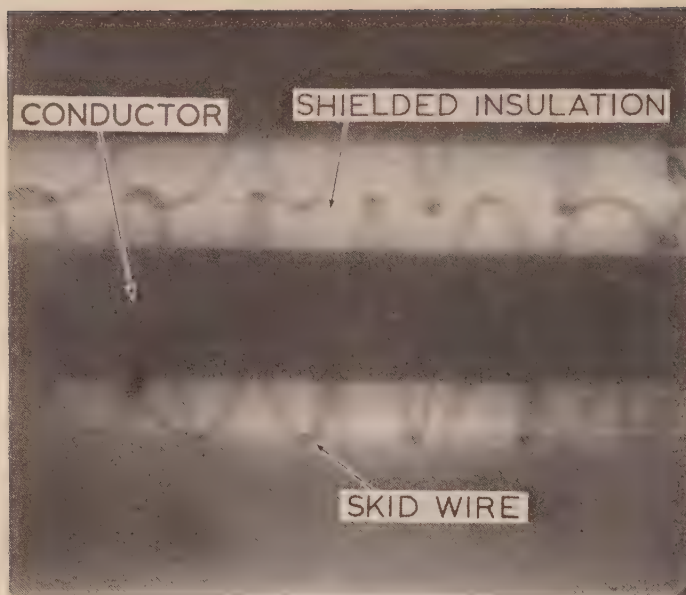


Fig. 5—X-ray photograph of undamaged section of 138-kv cable.

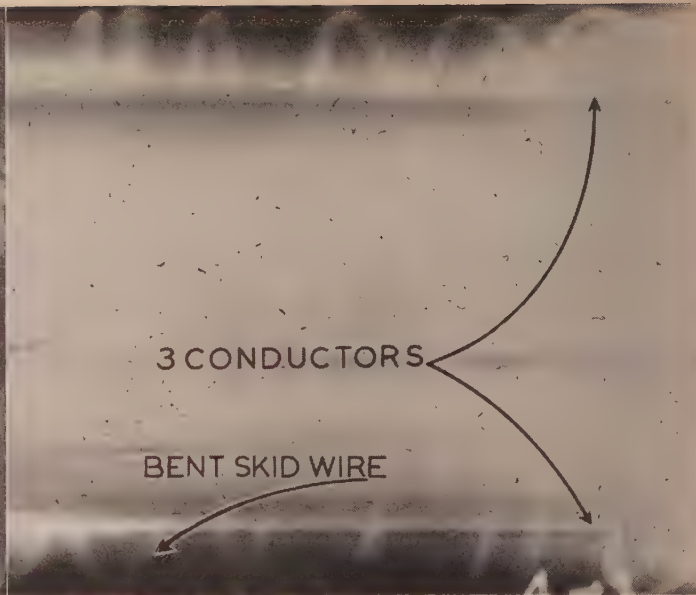


Fig. 6—X-ray photograph of damaged 138-kv cable showing bent skid wires.

print. This defect is a void in the root pass which probably occurred where the welder stopped and, on starting, did not apply sufficient heat to re-melt the existing weld metal. It was necessary to grind out and repair this weld. However, the outward appearance of this weld was good.

An example of a radiograph made using the Iridium 192 is shown in Figure 3. This figure shows a two-inch socket weld in which no defects were found.

Special Applications

A special application of radiography was made on a recent 138-kv pipe-type cable installation. Upon completion of a 2600-foot cable pull, it was discovered that the skid wire on the leading end of the cable was damaged. Dissection of the cable revealed that the cable insulation shield was broken and the insulation was damaged for as many as eight layers of paper. Fig. 4 shows the cable as it appeared when removed.

Examination of the "D" shaped skid wire revealed that it had caught on an obstruction that was about $\frac{3}{8}$ in. wide and $\frac{1}{16}$ in. high with a jagged edge. This obstruction had pushed the skid wire back and inward toward the conductor causing damage to the insulation and leaving a permanent set in the skid wire.

By means of radiography using Iridium 192, the extent of the damage was determined, thereby making it possible to salvage 2500 ft of undamaged cable by installing a buried joint and 100 ft of new cable.

Fig. 5 is a typical radiograph of the

cable and skid wire in the pipe. Since the radiation comes from a point source, a true view of only the center turns of the skid wire is obtained. It was possible in most cases to get a complete picture of the skid wire on all three cables with two exposures.

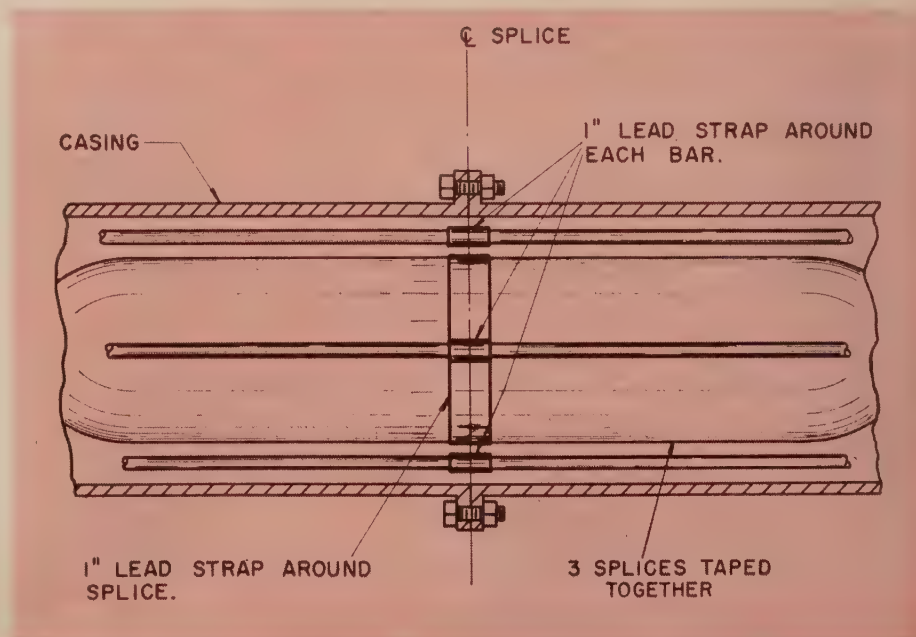
The radiograph reproduced in Fig. 6 shows the three cables in a different configuration from Fig. 5, and the damaged skid wires are visible at the bottom.

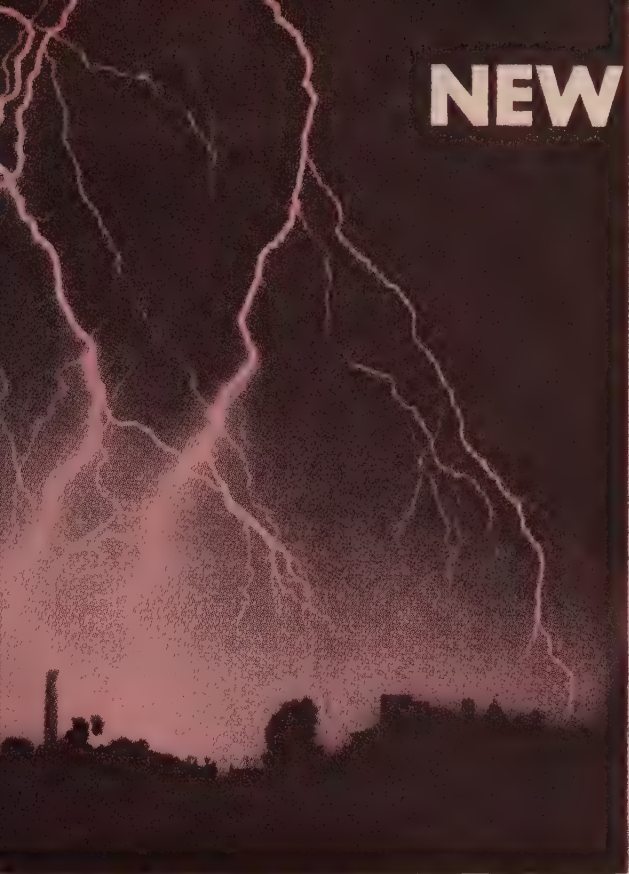
Another unusual application of radiography is in determining the amount of movement of pipe-type cable. This is accomplished by attaching lead strips to the splice and to the tie bars as

shown in Fig. 7. The lead strips are readily photographed with X-rays and the displacement can be measured without the necessity of de-energizing the line and disassembling the joint. Cable movement data thus obtained will be useful in future designs and will check the adequacy of present 138-kv semi-stop joints in accommodating cable movement.

X-ray inspection has a tendency to induce the welder to do better work and produce a sound joint. By improving installation techniques and solving special problems, radiography has proven its value as a reliable tool in the construction of pipe-type cable.

Fig. 7—By attaching lead strips to splice and tie bars, cable movement is measured by radiography without de-energizing cable.





NEW CONSIDERATIONS IN SHORT-CIRCUIT CALCULATIONS

By

J. R. Rankin, Jr.

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and

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System Planning and Development Department
Public Service Electric and Gas Company

Lightning can trigger a transmission-line fault that, with today's larger generating capabilities, can produce short-circuit currents of tremendous effect. Accurate calculations are required to ensure circuit breakers of adequate capacity.

Increased accuracy has been found in determination of circuit-breaker duties through including correction factors for asymmetry and actual pre-fault voltage. Method for doing this is described.

CONSIDERATION OF both new and conventional methods for calculation of circuit-breaker duties for the complete Public Service bulk system shows differences between results of the two methods of considerable and significant magnitude. Factors in the new method correcting for expected actual pre-fault voltage and for decay of asymmetrical component of fault current to moment of parting of breaker contacts provide a higher degree of accuracy in determination of circuit-breaker replacement programs.

Scheduled addition of a block of 640 mw of generation capability to the Public Service system during the fall of 1960 and spring of 1961 would so change duties required of the bulk-system circuit breakers that a complete new short-circuit calculation was required. It was desirable that latest industry thinking in making such studies be examined to ensure best accuracy

of results. A method involving many of these factors was devised and used.

Calculation procedure that was used is described briefly here in order to introduce various correction factors and to outline their significance.

Transformer Tap Settings

Equivalent impedance in the per-unit system used in network calculations to represent a transformer (as well as lines, reactors, generators, etc., that are connected to it) must be corrected to take account of transformer tap settings. Only when transformer tap setting is in the nominal position, that is, when application of nameplate voltage at no load to one set of terminals gives nameplate voltages on all other sets of terminals, can a transformer be represented by its equivalent per-unit impedance.

Thus, it is well to examine actual operating conditions before assigning

transformer per-unit impedances. Bulk systems are often operated (by manipulating generator fields, step-up transformer taps, or by step-down transformer fixed and variable taps) so that voltage on subtransmission buses at heavy loads is held equal to or greater than light-load voltage. This means that transformer fixed taps are frequently set as high as possible so as to obtain maximum utilization of tap-changing-under-load facilities under normal and emergency conditions. Consequence is that at most locations transformer taps (fixed plus tap-changing-under-load) are at positions other than nominal in order to provide the desired operating voltages.

It was found necessary to include this effect in studying the Public Service system. Impedance of the 132-kv system (present bulk-system backbone of Public Service) was kept at a voltage base equal to the nominal voltage

of 132-kv. Impedances of other parts of the system connected through transformers to the 132-kv circuits were determined from voltage bases corrected to values dictated by actual turn ratios in use rather than by nominal ratios. Corrections were made for off-nominal turn ratios by multiplying impedances of system elements involved by the factor $(V_{\text{nominal}}/V_{\text{tap}})^2$.

Pre-Fault Voltage

Expected actual pre-fault voltages rather than nominal voltages were used in determining breaker duties. It is obviously impossible to know actual pre-fault voltage that may exist at a given location at any particular time in the future. Therefore, highest actual operating voltage to be encountered at the breaker location under typical future heavy-load conditions was estimated and assumed to be the pre-fault voltage.

Interrupting Duty Under Steady-State Conditions Determined First

Next step in the study was to determine interrupting duty of breakers on the basis that asymmetrical, or d-c component of fault current had decayed to zero while symmetrical component had undergone no decay. Circuit-breaker interrupting duties were determined by assuming that other breakers normally connected to the

faulted facility had tripped before opening of the breaker under study. In addition, faults were considered in turn, first on one side of the breaker, and then on the other.

Reciprocals of system impedance in per-unit to each fault point corrected for off-nominal transformer turns ratio were calculated and highest value chosen. Multiplying this value by base mva gave most severe breaker interrupting duty.

This duty was further corrected by multiplying by square of ratio of expected actual voltage to old voltage base dictated by correction for off-nominal turns ratio.

Two Components Of Fault Current

Fault current on any phase can be resolved into two main components: a component which is symmetrical about the zero-current axis and an asymmetrical component which lies on one side of this axis. Both of these components decay with time.

A fault on a system causes sudden flux changes in rotors and stators of the machines connected to the system. Flux changes in machine rotors are associated with symmetrical component of fault current. Decay of this component is primarily a function of time constants of the rotor windings.

Flux changes in machine stators are associated with asymmetrical compo-

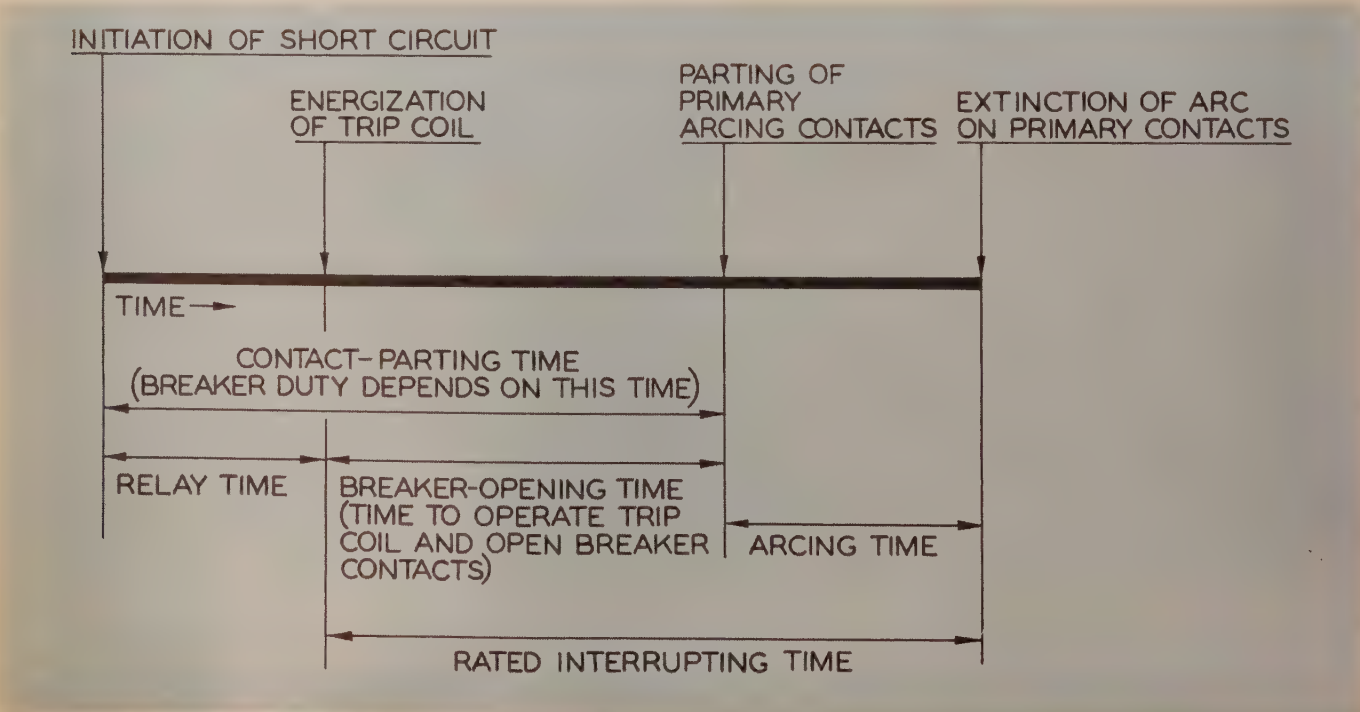
nent of fault current. Decay of this component is primarily a function of time constant of the stator winding plus the system connected to it.

Time constant of any circuit is ratio of its inductance to its resistance and, for a constant-frequency system, ratio of reactance to resistance is directly proportional to the time constant. Decay of the asymmetrical component of fault current at a given fault location is measured by the time constant of the system behind this location and, therefore, by ratio of system reactance to resistance at that point. This ratio is called the X/R ratio.

Magnitude of the asymmetrical component of fault current has an effect that varies with length of time between occurrence of the fault and parting of the breaker contacts. Times of a breaker operating cycle are related to each other as shown in Fig. 1. Most important of these times for determining breaker duty is to the contact-parting time or interval from initiation of fault to time when breaker contacts first separate. It takes an additional interval, the arcing time, for breaker contacts to open completely and for the arc to be extinguished.

Asymmetry correction factors on an assumed system X/R ratio of approximately 15 at the breaker location are given the AIEE paper No. 59-41. "The X/R Method Of Applying Power Circuit Breakers" by J. E. Skuderna.

Fig. 1—Interrupting duty on a circuit breaker depends upon amount of energy remaining in a fault at the time of parting of primary contacts. Both asymmetrical and symmetrical components of fault current begin to decay following instant of the fault at rates depending upon time constants of the circuit involved. Hence amount of fault current to be interrupted depends upon time delay before contacts part.



Asymmetry factors for this X/R ratio and for various contact-parting times in cycles are given in Table I.

TABLE I

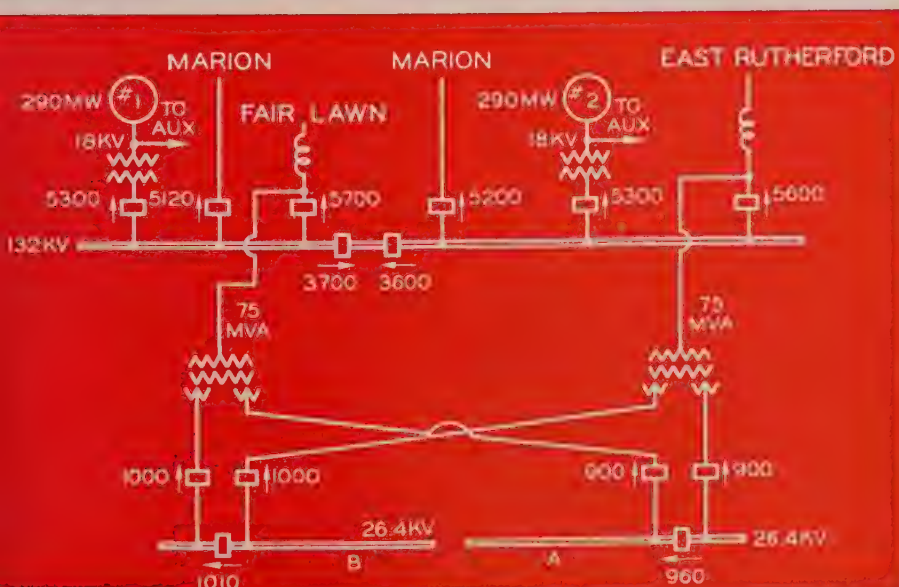
Asymmetry Factors For Calculating Short-Circuit Duty When X/R Equals 15

CONTACT-PARTING TIME (CYCLES)	ASYMMETRY FACTORS
1	1.4
2	1.2
3	1.1
4 (and above)	1.0

Ideally, X/R ratio at a breaker location should be calculated just as breaker duties are; for a fault on either side of the breaker with other breakers connected to the faulted facility tripped before the breaker under study. However, for simplicity, X/R ratio was calculated on the bus side only of the breaker with all normally closed breakers connected to this bus closed.

Correction for asymmetry was made by applying these multiplying factors to the mva obtained after correction for actual expected pre-fault voltage.

Fig. 2—Breaker duties of a section of the Public Service bulk power supply system are indicated here as calculated by both older method and by new method. Colored figures are results based on ASA-C 37.5—1953 standard and black figures by new method. Notice rather considerable difference between two sets of duties.



However, when X/R ratios were appreciably larger than 15, further corrections were made to take into account slower decay of the asymmetrical component. These factors are also given in Mr. Skuderna's paper.

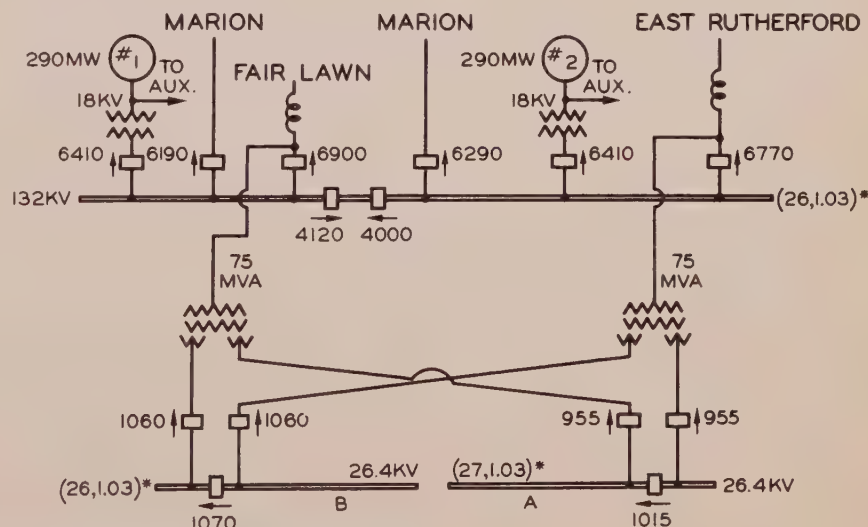
Duties of circuit breakers on one section of the Public Service bulk power system calculated by applying all corrections described here are shown in black figures on Fig. 2 opposite the respective breakers.

Colored figures on Fig. 2 show breaker duties at the same locations but as they would have been obtained using the usual standard method described in ASA-C 37.5—1953 and using nominal rather than expected actual pre-fault voltages. These duties calculated by the standard method are given on a one-per-unit voltage base and corrected only for a system X/R ratio of approximately 15.

Comparison between the two sets of

duties shown in Fig. 2 shows the considerable difference effected by use of additional correction factors. Inclusion in the new method of additional corrections for X/R ratios greater than 15 and of corrections for expected actual voltage rather than nominal results in breaker duties as much as 21 percent higher for these breakers when the improved method is used. Differences of this magnitude between the two methods were also encountered at other stations on the system and in particular cases were found as high as 30 percent.

One factor affecting breaker duty is not included in the improved method. The method of calculation described in this paper considers asymmetrical decay only, but not symmetrical decay. When a suitable method for calculating symmetrical decay is developed, proper inclusion of this factor will somewhat reduce the duties given in Fig. 2.



NOTE 1. First number in parenthesis is X/R while second number is estimated normal operating bus voltage in per-unit of nominal voltage shown on bus. Both numbers were used in calculating breaker duties by new method.

NOTE 2. Breaker duties shown in color assume one per-unit operating voltage and have been multiplied only by factors to include effects of asymmetry which assume an X/R ratio of approximately 15.

Equipment Prices: Some Up, Some Down

When the National Association of Purchasing Agents reported its most recent "Business Survey" last month, commodity prices were described as "remarkably steady, in view of the many conflicting forces to which they are being subjected." On the down side, there was one exception: electrical equipment.

What produced the lower prices for some items of electrical equipment? "Keen competition," says the NAPA Survey Committee.

An example of this is the outdoor oil circuit breaker business, where the entry of one regional supplier on a nationwide sales basis caused a competitor to cut breaker prices as much as 27 percent.

The manufacturer, I-T-E, merged its Los Angeles property, the 50-year-old Kelman Electric & Mfg. Co., a year ago, and beginning January first is launching a national sales program for its Kelman Power Circuit Breaker Division products.

I-T-E said it "was not surprised" by the competitor's price reduction. "Con-

scious of the possible effect on market price levels of this class of product by its entry into the field," said I-T-E, "we have carried out our program in a careful, step-by-step program. Now, by reason of a strengthened organization, improved production facilities, reduced cost of manufacture, and extensive test facilities being made available, I-T-E is better prepared to meet competitive market price levels."

But, characterizing electrical equipment prices as "soft" is disputed by a spokesman for the manufacturers, J. L. Singleton, senior vice-president of Allis-Chalmers. Just before he completed his term as president of NEMA recently, the A-C executive expressed the view that "recent price reductions on turbine-generators by American manufacturers were just normal competition—not a price war." He minimized the effect of foreign competition on prices, also.

On the other hand, GE's Board Chairman Cordiner, in his year-end statement, acknowledged the effect of foreign competition, stating that man-

agement and employees in the departments facing heavy competition from abroad "have been cooperating in dramatic efforts to meet it. As a result," he noted, "the Company has ventured the announcement of significant reductions in the prices offered on heavy power equipment . . . and a number of important contracts have been won against foreign competition."

And, as utility buyers well know, all equipment prices are not coming down. One recent example of prices moving up, rather than down is this: On December 1, Westinghouse announced a "realignment" that produced power transformer prices of more than 10 percent above "recently obtained prices." (And, Allis-Chalmers also announced 10-15 percent increases on power transformers, effective Jan. 1.)

But, R. N. McCollom, manager of the Westinghouse power transformer department, said that "these prices will be lower than the prices in effect for many months earlier."

Mr. McCollom said it is necessary to obtain higher prices "to support the research and development required if we are to keep ahead of the technical needs of the fast-growing electric utility industry and other industries."

"Past Westinghouse developments have shown how important this research work is to industry," he said. "Westinghouse development of forced oil cooled transformers alone has saved the utility industry more than \$100,000,000. Other significant savings have come from such advances as improved core steel, Insuldur insulation, inner-cooled construction, higher voltages, and better shipping methods.

"For a considerable period of time, we have absorbed substantial cost increases and an increase in realized prices is important now for continuation of the heavy program of research and development in this field."

In the light of this announcement



PROBLEM. How do you transport and set up a 65-ft microwave antenna tower in an inaccessible mountain location? **SOLUTION:** Go by air. Whole assembled tower was picked up, transported five miles and positioned in 12 minutes by this Hiller 12E helicopter.

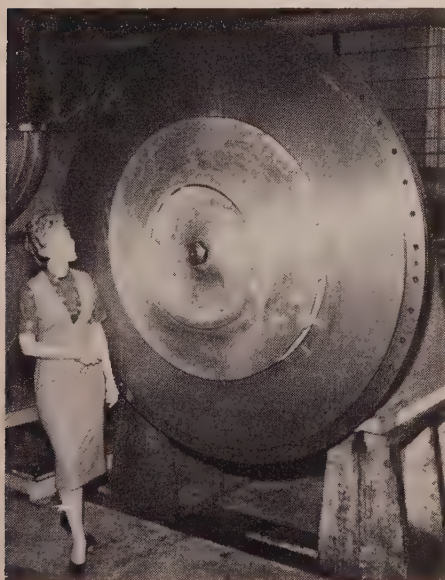
by Westinghouse, effective December 1, it is interesting to note that General Electric has announced a reduction of approximately five per cent on large power transformers rated 12,000 kva and higher. G-E also announced an escalation policy on units to be shipped after 12 months from date of order, whereby prices will be escalated in accordance with Bureau of Labor statistics, starting with the date of the order. Customers will pay the increase above 2½ per cent.

H. K. Porter Co. Expands

H. K. Porter Co., Inc. acquisitions now give this growing company a 15-product diversification for the electrical industry. Thus far, 22-percent of the company's sales are in the electrical equipment field.

Most recent expansion was the addition of the Peerless Electric Division, adding electric motors to 40 h.p., fans and blowers to the line. Also acquired recently, the Hill Transformer Company now supplements the Delta Star division's transformer line with dry type and power transformers.

Earlier this year Porter purchased National Electric Products Corp., manufacturer of wire and cable, conduits and raceways. The Thomas Insulator Company was added in 1958.



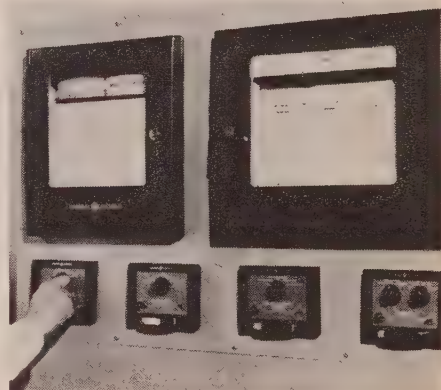
WORLD'S LARGEST brazen aluminum enclosed impeller will be furnished with an Allis-Chalmers new D style scroll case centrifugal compressor for the City of Hillsdale (Mich.) utility. Although it has an outside diameter of 46¾ inches and is 2¾ inches thick, it weighs only 265 lbs, some 485 lbs lighter than an impeller of the same dimensions made of steel. Lighter weight will give faster startup to give high initial inrush of air.

NEW PRODUCT

DESIGN

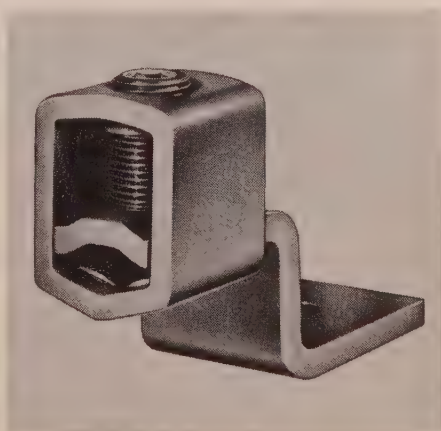
Steam Turbine Supervisory Instrument System

Closer supervision of steam turbines is possible through faster recordings of the **General Electric Co.** steam turbine instrumentation system. Additionally, the system requires 65 per cent less panel space. G-E will supply the improved TSI systems on all new steam turbines over 100,000 kw and make them available for smaller units. Size reduction of a typical TSI panel area is from 18 sq ft to 6 sq ft. Tube requirement has dropped from 22 to 7, not only helping to decrease size, but also to improve reliability and ease of maintenance. Records data on two strip chart recorders instead of previous four. One recorder prints speed or valve position and shaft eccentricity, the other prints shell and differential expansion, and shaft vibration. The re-



corider scans and records every five seconds—for a turbine having eight vibration detectors, each will be recorded every 40 seconds.

For more data, mark #1 on reply card



Solderless Lugs

Ilseco Corp. has introduced a line of electro tin-plated, pure seamless copper solderless lugs that can be used for either copper or aluminum conductors. Features claimed for the Series SLUH lugs are heavy construction, for extra strength, high torque value, low heat rise, captive tongue that cannot fall out and V-type serrated vice jaws for increased cable-holding strength. Lug employs a single bolt for attachment.

For more data, mark #3 on reply card

Solid-State Annunciator

An economical miniature solid-state annunciator for power plant use has been developed by **Panellit, Inc.** The low-drain, intrinsically safe, easily expandable annunciator has no moving parts. Has low energy control circuits and negligible inductance. Operates on standard a-c or d-c line voltages. Can be expanded due to interchangeable plug-in units. Will fit either 5 x 5 in. or 6 x 6 in. instrument case or standard annunciator cabinet.

For more data, mark #2 on reply card





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COHARDITE
INSULATED
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Shear-action cutter — cuts all soft or hard steel cable and wire rope up to 3/4"! No deforming of wire — notched jaws lock cable during cut! Cuts fine or coarse stranded cable easily and cleanly.



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Order from your supply house or write direct for free PORTER CATALOG — Showing many other tools for utility companies.

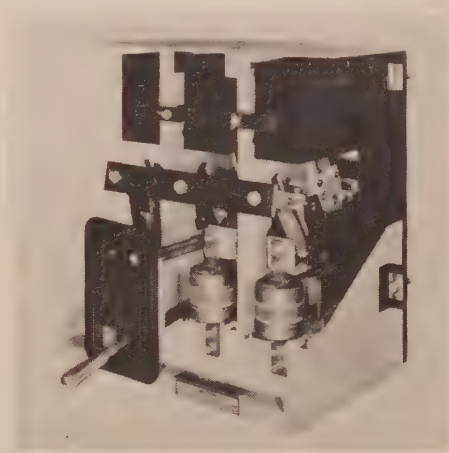


H. K. PORTER, Inc.
Somerville 43, Mass.

Coordinated Fuse-Breaker

Fusematic, a 600 v 200,000 amp coordinated fuse breaker unit is said to offer fault circuit protection at substantially lower costs than a conventional breaker. By **Federal Pacific Electric Co.**, it combines components of conventional low-voltage power circuit breakers and current limiting fuses. Rated up to 1600 amps continuous and 200,000 amp interrupting capacity. Primary application for service entrances and feeder protection where high fault current exists. Either manual or electrical operation.

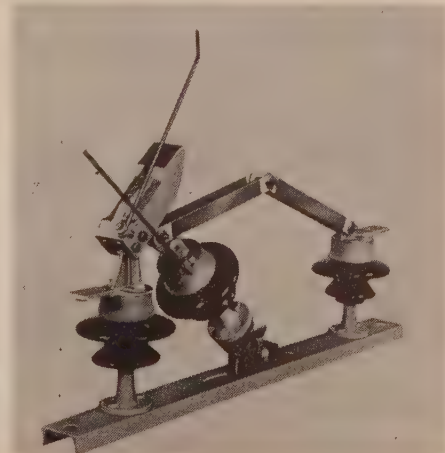
For more data, mark #4 on reply card



Shuntless, Tilting Switch

Southern States Equipment Corp. has announced a shuntless, tilting, insulator switch, Type TRS. Available in ratings of 7.5 kv to 23 kv and continuous current ratings of 400 and 600 amps, momentary ratings of 20,000 and 40,000 amps respectively. Reverse loop type contact provides more than adequate capacity for rated short circuit currents. Features extra-large sleet hood which prevents collection of ice on the contact assembly.

For more data, mark #5 on reply card



Power-Leveling Mechanism

The Utility Division of **Highway Trailer Co.** has introduced a power-leveling mechanism which makes positioning fast and easy in all directions. It is optional equipment on their model HDA and HDAMS earth borers and permits rapid leveling where necessary on guard rail and line construction jobs. Engineered for positioning in any angle up to 90 degrees, it permits fast maneuvering of machine fore and aft, right and left, regardless of truck position.

For more data, mark #6 on reply card



Pad-Mounted Distribution Transformer

General Electric Co. has announced a line of single-phase pad-mounted distribution transformers with high- and low-voltage compartments at opposite ends. High- and low-voltage compartments are electrically isolated. For residential underground systems, the transformers require no additional housings or fences. Transformers with different ratings are interchangeable on a given pad. Available in ratings of 25, 37 1/2, 50, 75 and 100 kva.

For more data, mark #7 on reply card

Microwave-Telephone Hookup

Cartefone, by **Carter Electronics Corp.**, allows direct communication from a mobile communication unit to any public telephone. Base station operator establishes contact with any party with telephone service. Telephone handset is placed in position on Carterfone cradle and direct hookup is made automatically. Cut off at end of call is also automatic. Auxiliary speaker allows monitoring. Requires no additional equipment or installation in mobile units.

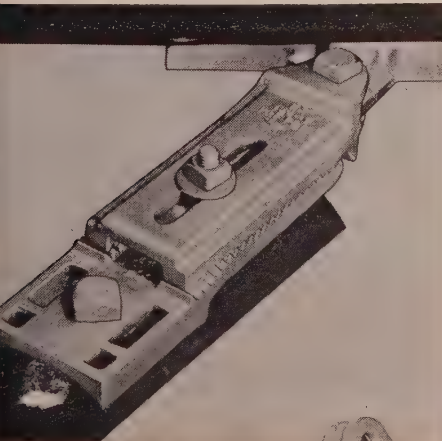
For more data, mark #8 on reply card



Spar Connecting Hardware

Up to a six-inch adjustment at each end of the inner and outer braces of an H frame superstructure is possible with the use of the new **Malleable Iron Fittings Co.** adjustable link. It eliminates the need for field drilling previously required due to sleeps and crooks in the poles and round members. The fitting has the grid gain type of contacting service with integral teeth and spurs to grip and distribute the load over a large area. Single bolt connection keeps erection costs down.

For more data, mark #9 on reply card



LET'S TALK ABOUT STRAND...

Aluminized STRAND

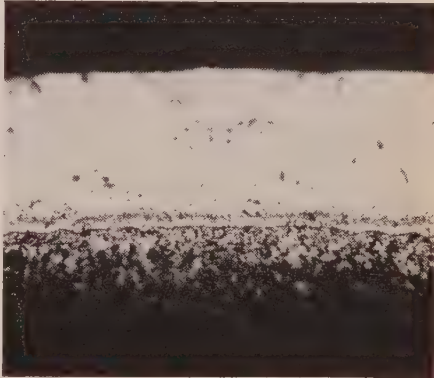
ACCO Aluminized steel strand is composed of steel wires which have an adherent, ductile aluminum coating applied by the hot dip method. The result—strand with all the strength of steel, and with the corrosion-resistance of aluminum. Also, you get these important advantages:

Aluminum oxide protection—Aluminum, when exposed to the atmosphere, has a film of aluminum oxide formed over it. This film, though thin, is impervious to corrosive atmospheres, provides extra protection in the most severe service.

Electrochemical protection—Should nicks or cuts pierce the aluminum coating, the corrosion-resistance will be retained by an electrochemical "healing" process.

Salt spray tests, conducted according to ASTM procedures, show that with equal thicknesses of coating, aluminized outlasts galvanized by more than 2 to 1. Available for guy wire, ground wire and messenger wire applications, Page ACCO Aluminized steel strand is offered in Common, Siemens-Martin, High Strength, Extra High Strength and Utility grades with physical properties conforming to ASTM Spec. A-122-54T and A-363-58.

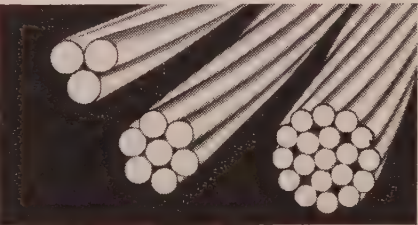
Page also makes galvanized and stainless steel strand.



500X magnification above shows thin aluminum-iron alloy resulting from diffusion of the two metals, and the outer layer of aluminum in the form of a fine-grain cast structure.



5-year test exposure to industrial atmospheres covered strand with coating of sulfide, oxide and soot. Scrubbing with soap and water showed aluminum coating completely unaffected.



Page ACCO Aluminized steel strand is available with 3, 7 and 19-wire construction.



WRITE FOR DETAILS. Booklet DH-537 explains manufacture, properties and uses of Page ACCO Aluminized Steel Strand. Write us at Monessen, Pa., for your copy.



PAGE MANUFACTURERS WIRE

Page Steel and Wire Division
American Chain & Cable Company, Inc.
Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore. San Francisco, Bridgeport, Conn.

OTHER ACCO ALUMINIZED STEEL WIRES



Aluminized ACSR core wire now available from leading manufacturers of aluminized conductor cable.



Page Chain Link Fence of ACCO Aluminized wire provides economical, longer-lasting protection.

Tie wire, telephone and telegraph wire, lashing wire, barbed wire, and other products are also available in Page ACCO Aluminized wire.

Ask us for details.

PAGE -the source for answers to wire problems

333-KVA Distribution Transformer

Suitable for either pole or platform installation, a 333-kva distribution transformer has been added to its Pole Star Featherweight line of transformers by **Pennsylvania Transformer Div., McGraw Edison Co.** It is lighter and more compact than the station-type it replaces and provides better regulation. Average impedance is 2.5 to 3 per cent compared to an average of 4 to 5 per cent for station-type transformers.

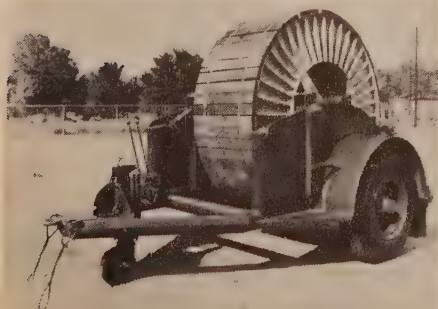
For more data, mark #10 on reply card



Reel Carrier

Truck Equipment Co. has announced a modified reel carrier which accommodates reels up to 62 inches wide. A newly designed axle, wheel and hub assembly permits an eight-in. increase in inside width, enabling the carrier to handle wider reels now being produced by cable manufacturers. Standard truck trailer will take reels up to 96 in. in diameter, and up to 14,000 lbs. Trailer of greater capacity is available on special order to handle reels up to 108 in. diameter, 72 in. wide with a 20,000 capacity. As optional equipment, Truco will supply payout tensioning and pulling equipment for the trailer.

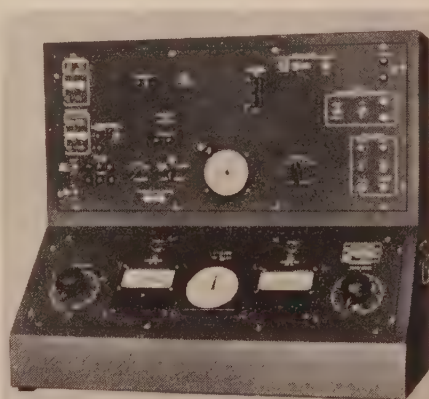
For more data, mark #11 on reply card



Speed-Indicating Instrument

A speed-indicating instrument for use with small steam or gas turbines by **Westinghouse Electric Corp.** has no mechanical connection between it and the rotating shaft. Speed is sensed by an electromagnetic pickup, located near a gear or notched shaft. Signal is transformed through an all-static circuit to a d-c millivolt signal. Proper design of the gear or notched shaft will allow adaptation to almost any rpm range.

For more data, mark #12 on reply card



Relay Test Set

A high-current relay test set with built in instrumentation for testing and calibrating distance relays is available from **Multi-Amp Electronic Corp.** Also suitable for testing differential, directional, and other types of protective relays. Rated 0.4 kva, it is designed for 120 v, three-phase, 60-cycle operation. Relays can be tested one phase at a time. Instrumentation includes multi-range ammeter and voltmeter, timer and phase angle meter.

For more data, mark #13 on reply card

Hydraulic Power Package

A unit designed to power all the hydraulic equipment needed on a utility construction body is now an integral part of the Uni-Power Body by the **Holan Corp.** Consists of 56 hp Wisconsin 4 cylinder air cooled engine, Braden Hydraulic Winch and tandem hydraulic pump with 50-gallon oil reservoir. Will power the hydraulic derrick, winch, digger, and supporting jacks. Entire unit can be mounted or changed over in less than four hours.

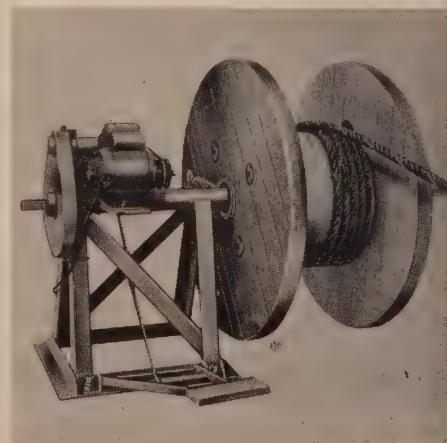
For more data, mark #14 on reply card



Wire Rope Reeler, Coiler

An electrically driven heavy duty reeler and coiler has been introduced by **Sherman and Reilly, Inc.** The motor is a heavy duty capacitor type with 400 per cent overload rating, 110/220 60 cycle single phase, with a completely enclosed, oil emersed gear reducer. Equipped with a 20-in. coiling head, it has a rope speed of 89 ft per minute. Shaft is 2-in. diameter for small reels, has two reel bushings for 5-in. arbor holes for reels up to 38-in. diameter.

For more data, mark #15 on reply card



DIGITAL COMPUTER . . .

(Continued from page 49)

is the punched customer card used in the annual transformer load study program. This card contains the customer's account number, transformer location number, and peak month kilowatt hours. From this card statistical kva is computed for each transformer. In revising and combining the tested programs into one general program, this customer card becomes the prime source of data, the very foundation upon which the general program is constructed. We propose to use this statistical kva as well as, or perhaps in lieu of, name-plate kva as was used in the original programs. It is almost certain that accuracy will be improved.

Fig. 9 summarizes the structure of the general program. It starts at the grass roots with the individual customer and his kilowatthour meter. It takes the next step up to the individual transformer, combines several transformers into one line section and, finally, in correct electrical sequence, goes through these line sections back to the substation.

Theoretically, distribution is a prime application for the digital computer because of its ability to economically handle large masses of data. Nevertheless, it is impossible to estimate the cost of such a program, since existing data and procedures vary widely between different companies. Even in our own company, such an estimate would be difficult because most of the required house cleaning had become necessary whether or not we attempted the application of data-processing equipment.

Based on this company's experience, for every dollar spent on actual computer programs and machine rentals, five to twenty dollars will be spent in accumulating data and in the design and installation of procedures necessary to maintain these data. However, all the dollars spent in solving these acute problems on machines represent a very small fraction of the amount which manual work would have required, even if such had been possible. These expenditures have already been repaid by resulting savings.

We have become convinced that further improvements and economies which can be realized from the application of digital computers to distribution problems will be limited only by the imagination and tenacity of the distribution engineer.

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GALVANIZED

STEEL STRAND



TENSILE STRENGTH TESTS*

Laboratory Tests

Assure HIGH DEPENDABLE QUALITY

When you specify a size and grade of CRAPO Galvanized Steel Strand you can be sure that it will meet or exceed the required standards. The wire used in its manufacture is laboratory tested in process, and before stranding, for tensile strength, ductility, elongation, gauge, and the quality and weight of the zinc coating. The finished strand is rechecked by the laboratory for tensile strength, lay, wire diameter, ductility and galvanizing.

This continuous testing is but one of the reasons why CRAPO galvanized steel strand enjoys a reputation second to none for long life and dependable performance. More than 50 years of specialized skill and experience in producing quality strand for the power and communication industries are your further assurance of its all 'round reliability.

Send for this New FREE Booklet

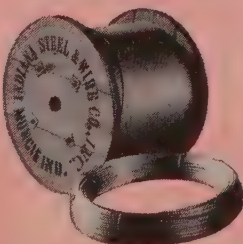
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For Guys, Messenger and Overhead Ground Wire

All sizes and grades of CRAPO Galvanized Steel Strand are available in A, B and C coatings. Class B coating is twice as thick as Class A coating; Class C is three times as thick as Class A.

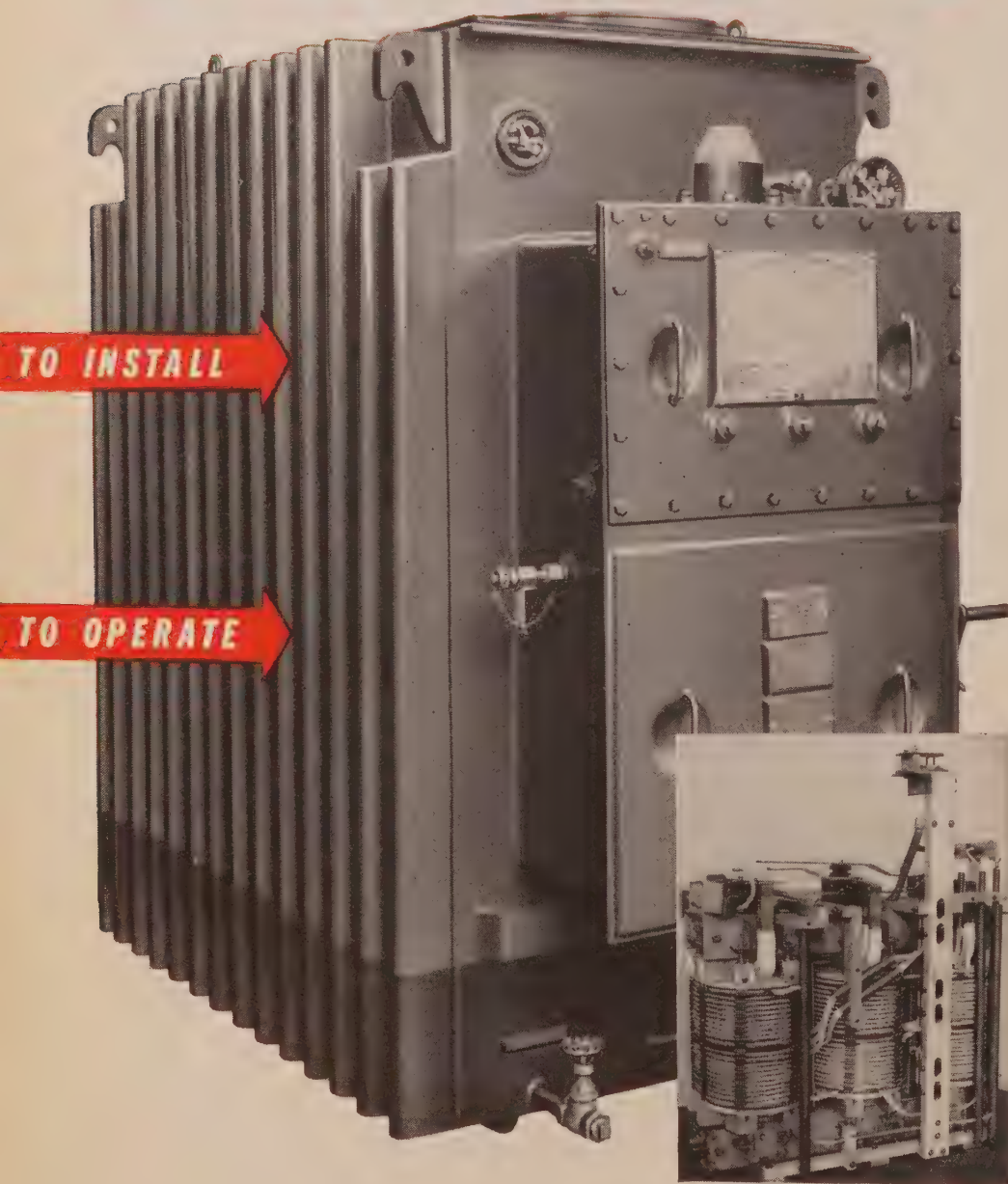


*Determines ductility of wire and adherent quality of galvanizing.

INDIANA

STEEL & WIRE CO., INC.
Muncie, Indiana

ECONOMICAL



Moloney Network Transformers are uniquely designed both inside and out to provide a superior unit for use on secondary network distribution systems. The corrugated tank coupled with a compact, rugged core and coil assembly having high overload capability, offers the potential user many reasons for purchasing Moloney Network Transformers.

These units are available in types conforming to EEI-NEMA Standards or in types especially designed to meet the requirements of your network system.

Specify Moloney Transformers for every application . . .
All Along The Line.

MOLONEY ELECTRIC COMPANY

Transformers for Utilities, Industry and Electronic

FACTORIES AT ST. LOUIS 20, MO., AND TORONTO, ONT., CANADA

BECAUSE:

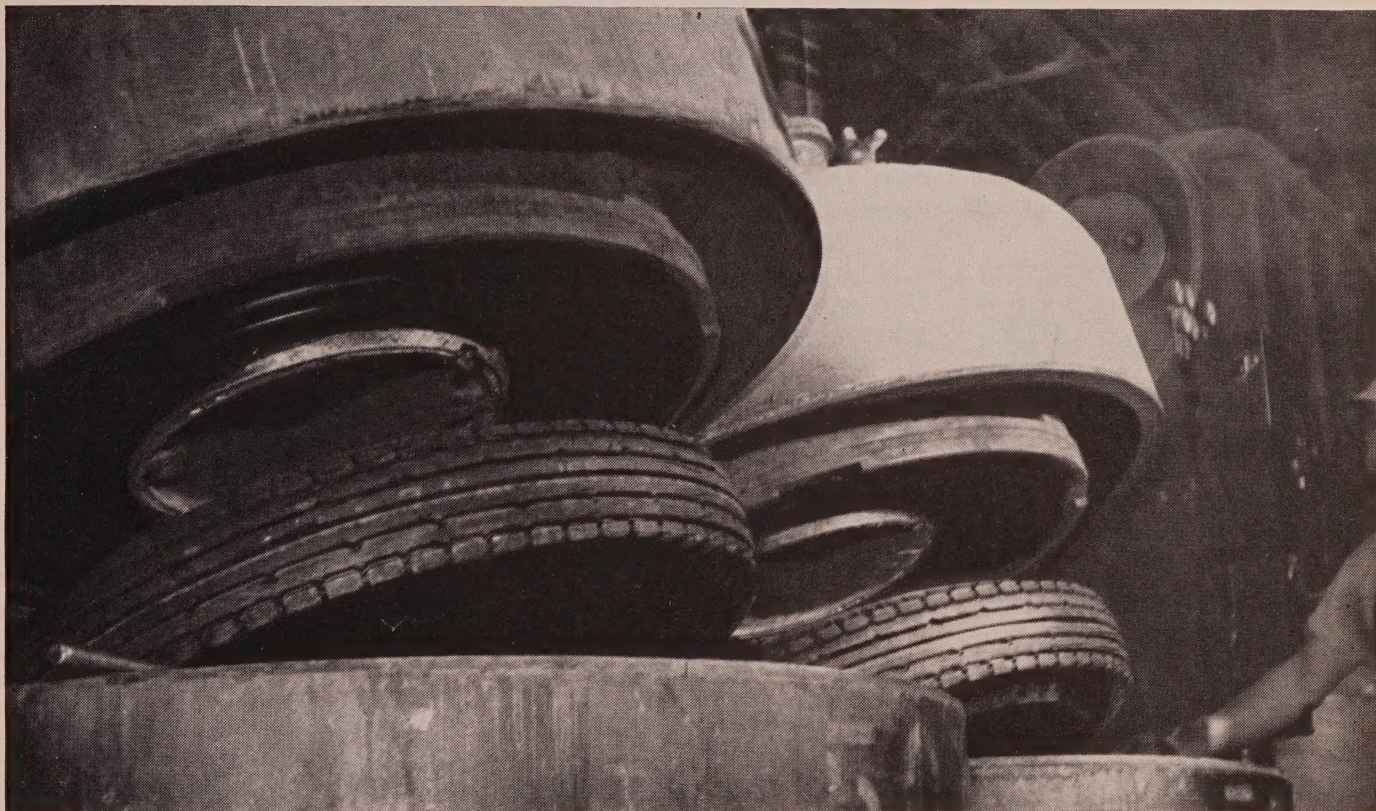
1. Each tank side completely corrugated out of one piece of metal, requiring welds only at the corners.
2. No thinning of the metal occurs at corrugations.
3. The corrugations do not need sidewall bracing therefore, another possible source of corrosion is eliminated.
4. Tank is easily cleaned from above and there are no inaccessible areas to hinder painting.
5. The tank and handhole covers are welded in place to eliminate the possibility of leaks, however, bolted covers are available if required.
6. Network transformers with corrugated tanks are smaller in size than old style tube type tanks.
7. Reduced size allows installation of larger units in existing vaults.
8. Protection against corrosion is provided by undercoating the base and the lower portion of the tankwall.
9. The core, coil, leads, supporting members and framework are uniquely combined to give ample electrical clearance and to obtain a rugged unit that is exceptionally compact.
10. Low sound level means better customer relations.



Applications

Sales Offices in All Principal

THE U. S. TREASURY SALUTES THE RUBBER INDUSTRY

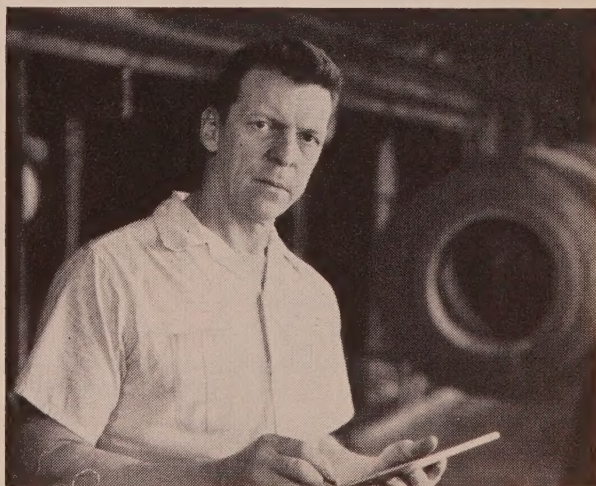


and its people who buy Savings Bonds and strengthen America's Peace Power

Americans who work in the rubber industry are proud of the rapid strides being made in their field, both in volume and in variety. Automotive rubber products and molded and mechanical rubber goods show constant gains in quality and quantity. Further, the rubber industry has done pioneer work in such novel applications as moving sidewalks and collapsible tanks for liquid storage.

People who work in this 7 billion dollar industry are proud of another thing, too: the help so many thousands of them are giving to America's Peace Power through the purchase of U. S. Savings Bonds. By regular purchases of Shares in America, these patriotic and forward looking people are reinforcing their own security after retirement. By this means they establish reserves for emergencies as well as for long range family projects, like education and home building.

If your company has not, thus far, set up a Payroll Savings Plan, you can start immediately. Just telephone your State Savings Bonds Director and accept the help he is anxious to give you. Or write to Savings Bonds Division, U. S. Treasury Department, Washington, D. C.



Harold E. Kalb is shown here at his work in one of the great manufacturing plants of the rubber industry. Like many thousands of his fellow craftsmen, Mr. Kalb is using his company Payroll Savings Plan to contribute regularly to the Peace Power of his country.



ELECTRIC LIGHT and POWER



THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRIOTISM, THE ADVERTISING COUNCIL AND THE DONOR ABOVE.

Ebasco Names Vaughan

Fort F. Vaughan has been named executive vice president of Ebasco International Corp., EIC President Grant O. Hylander has announced. Mr. Vaughan, formerly a vice president of the corporation, will retain his post as a company director.

Mr. Vaughan has been with the AFP System and its affiliated companies for 36 years. During that time he has completed assignments in construction, engineering, operations, financial and legal fields.

MEN OF

POWER



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Our client company will handle the Distribution, Sales and Service of your products to utilities nationally on a basis highly advantageous to you.

This is a well established, highly successful manufacturer of public utility construction equipment. They have just enlarged and streamlined their marketing management. They are undertaking extensive development of their own products. In addition, they will complement their line with related products, large and small—pneumatic, electrical, hydraulic, mechanical equipment and accessories. They will handle only one product of a kind.

This is your opportunity to increase your sales through a dynamic and aggressive selling organization.

We have been retained so that principals may inquire in confidence. Acceptable companies will be put in direct contact with the principals of our client company.

Write or telephone:

Mr. Don J. Withers, Division Manager

ALAN R. KRULL AND COMPANY

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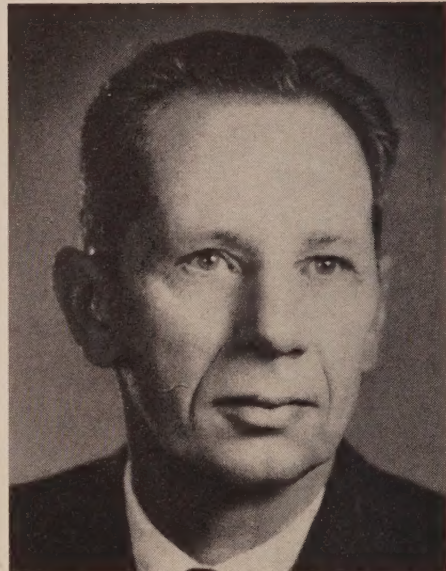
Bosanko New V.P. at I-T-E

Alfred G. Bosanko has been elected to the newly-created post of Vice President, Indoor Distribution, of I-T-E Circuit Breaker Company, Philadelphia.

In his new position, Mr. Bosanko, a Director of I-T-E since February 1957, will be responsible for the overall operations of I-T-E divisions and subsidiaries which produce indoor distribution products of 600 v and below. They are: Bulldog Electric Products Division, Small Air Circuit Breaker Division, The Chase-Shawmut Company, Wilson Electrical Equipment Co., Inc., Walker Electrical Company, Inc.

The new corporate arrangement is designed to manage more effectively I-T-E's expanding line of products.

Mr. Bosanko has been engaged in the electrical industry for over 35 years. Before assuming the presidency



of the Walker Electrical Company, he was associated with the engineering departments of the Empire Switchboard Company and of the Royal Switchboard Company.

Burnett SEGCO V.P.

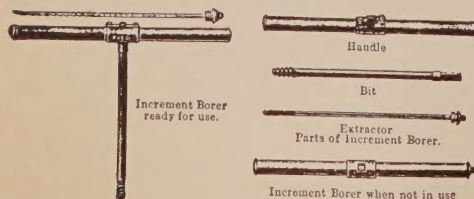
Andrew E. Burnett, operating manager of Southern Electric Generating Company, of Birmingham, Alabama, has been elected a vice president of the corporation.

A graduate of Alabama Polytechnic Institute in 1930 and holder of a master's degree from Massachusetts Institute of Technology, Mr. Burnett has held various engineering and operating positions with Alabama Power Com-



pany. Prior to joining Southern Electric Generating Company in 1957 he served as manager of employee relations for Alabama Power Company.

SWEDISH INCREMENT BORERS



The Swedish Increment Borer is by far the best instrument yet devised to determine the characteristics of standing timber. It is extremely light, small in bulk, handy and portable. It makes the smallest possible hole consistent with the purpose of boring; and materially reduces the expense of boring. It makes for accuracy in observation, since the cores obtained with it are exact and permanent records which may be examined at leisure under the best conditions. No skill is required to operate it.

These increment borers are being used by the Federal and State Forest Services, lumber companies, telegraph and telephone companies, creosoting companies, etc.

SWEDISH INCREMENT BORERS

Length of Bore	Instrument Complete	Bit only	Extractor only
2 1/4 in.	4330 1/2	4330 1/2 B	4330 1/2 E
4 in.	4331 1/2	4331 1/2 B	4331 1/2 E
6 in.	4332 1/2	4332 1/2 B	4332 1/2 E
8 in.	4333 1/2	4333 1/2 B	4333 1/2 E
10 in.	4334 1/2	4334 1/2 B	4334 1/2 E
11 3/4 in.	4335 1/2	4335 1/2 B	4335 1/2 E
13 3/4 in.	4336 1/2	4336 1/2 B	4336 1/2 E
15 3/4 in.	4337 1/2	4337 1/2 B	4337 1/2 E

BARTLETT MFG. CO.

3047 E. Grand Blvd., Detroit 2, Mich.

Send for Complete Catalog of Tree Trimming Tools

MEN OF POWER BRIEFS

Harold J. Rowe has been appointed director of public information for Iowa Electric Light and Power Co., a new

position in the company. **Milton Kapp, Jr.**, has been named advertising manager.

R. O. Wheeler has been promoted by Gulf States Utilities from superintendent of the gas department in Baton Rouge to division manager in the city. He succeeds **H. E. Brown**, whose recent promotion to vice president was announced last month.

Southern California Edison Co. has announced the appointment of **Al Maxwell** as manager of taxes.

Executive Vice President **William H. Dunham** of the Central Maine Power Co. has been elected a director of the company.

Perry L. Greenwood has become manager of personnel administration of Iowa Power and Light Co.

New administrative assistant to Paul B. McKee, chairman of the board, Pacific Power & Light Co. is **Lea Phillips**. He is formerly residential sales director of the company.

James F. Purcell of Northern Indiana Public Service Co. has been elected president of the Indiana Public Relations Society.

William R. Wagner, Appalachian Power Co., has been appointed district area supervisor for the Milton and Hamlin, W. Va., area.

Connecticut Light & Power Co. has promoted **H. S. Freeman** to the position of superintendent of the Housatonic Hydroelectric Division.

American Electric Power Co. has elected **James B. Berg** an assistant treasurer.

Ebasco Services Incorporated has added two men to its management consulting division. **Mario C. Yon** has joined the firm as chief marketing consultant and **R. D. MacTavish** will be a general management consultant.

J. Scribner Allen has been appointed sales representative for the Edison Electric Institute sales division. He will be located in Washington, D. C.

Named assistant manager of distribution engineering for the Duke Power Co. was **P. D. Huff**, former assistant supervising engineer. At the same time, **James W. Foster** was appointed supervisor of distribution engineering and **Henry L. Cranford** was made supervisor of rural extensions.

General Electric Co. has announced three new promotions: **Charles J. Meloun**, manager of marketing for the outdoor lighting department; **James L. Richardson**, advertising and sales promotion manager of the

distribution transformer department, and **Robert B. Ames**, manager-marketing, medium transformer department.

Named as directors of BICC-Burndy are **Sidney Wolberg**, **George Szabad**, and **Alan Thomson**, all of Burndy, and **Eric Bowyer**, **E. F. Duncan**, and **R. A. Crook**, of BICC.

To effect closer liaison with customers and improve field services, Preformed Line Products has advanced **Kenneth R. Miller** and **Fred J. Lekson** to the positions of District Managers of Sales. Mr. Miller will be responsible for the area west of the Mississippi River, and Mr. Lekson will be in charge of the area east of the Mississippi.

The Rome Cable division of Alcoa has announced the appointment of four new product managers: **F. R. Dallye**, electrical conductor accessories; **W. W. Knapp**, overhead transmission and distribution conductors; **D. H. Thayer**, building construction conductors, and **J. R. Woods**, power conductors.

Panellit, Inc. has announced the appointment of **Stanley Knoblock** as chief engineer for its eastern division, with headquarters in New York.

D. V. Wedeman has been appointed general sales manager of the utility division of Highway Trailer Co.

Triangle Conduit & Cable Co., Inc. has appointed **Glen J. McMahon** plant manager for the conduit and armored cable division. The company also has announced that **Roger E. Martin** has been elevated to the position of director of research and development.

Frank T. House is the new sales promotion manager and **Hermann A. Burkhardt** the new publicity manager at Bucyrus-Erie Co.

A. S. Kranzley has been appointed manager, product planning, for the electronic data processing division of Radio Corporation of America.

Westinghouse Electric Corp. has chosen **George E. Richardson** to be the manager of their new multi-million dollar power transformer plant now under construction in Muncie, Ind.

Anderson Electric Corp. has recently appointed **Thurman L. Rundlett** as chief engineer. He was formerly with Westinghouse Electric Corp.

Clifford E. Mathewson has been named advertising and public relations manager for the Control System Division, Daystrom, Inc.

Snapit-On

Protector Shields for

CONDENSER AND BOILER TUBES

DETERS EROSION

PREVENTS MATERIAL WASTAGE

REDUCES MAINTENANCE

GIVES TUBES LONGER LIFE

MADE IN STAINLESS STEEL
AVAILABLE IN ALL SIZES

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EXPANDING EARTH ANCHORS



FOR RUGGED DEPENDABILITY Specify **Grip-Lite**

Come To Us With Your Anchoring Problems,

Exclusive wing dimples and deeply embossed base plate, distributes stress evenly. You get more holding power! Other features include four-way design, nut retainers which prevent anchor from sliding, and double-strength anchor top.

DEPENDABILITY AT LOW COST

STEEL EXPANDING **Grip-Lite** ANCHORS

Grip-Lite MANUFACTURING CO.
BOX 111 WINTERSET, IOWA

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AND THEIR AGENCIES

January 7-9—Edison Electric Institute, Fourth Annual Live Better Electrically Women's Conference, Edgewater Beach Hotel, Chicago, Ill.

January 21-22—Edison Electric Institute, Transmission and Distribution Committee, St. Petersburg, Fla.

January 21-22—Pennsylvania Electric Association, Systems Operation Committee, Philadelphia, Pa.

January 25-29—Doble Engineering Conference, Sheraton Plaza Hotel, Boston, Mass.

January 28-29—Pennsylvania Electric Association, Transmission and Distribution Committee, Hotel Pittsburgh-Hilton, Pittsburgh, Pa.

January 31-February 2—Public Utilities Buyers' Group, 29th Annual Mid-Winter Conference, Atlanta Biltmore Hotel, Atlanta, Ga.

January 31-February 5—American Institute of Electrical Engineers Winter General Meeting, Hotel Statler, New York, N. Y.

February 1-4—Industrial Electrification Council, Fourth Biennial National Electric Heating Conference, Netherland Hilton Hotel, Cincinnati, Ohio

February 4-5—Pennsylvania Electric Association, Electrical Equipment Committee, Harrisburg, Pa.

February 8-9—Missouri Valley Electric Association, Annual Industrial and Commercial Sales Conference, President Hotel, Kansas City, Mo.

February 15-16—Edison Electric Institute, Electrical System and Equipment Committee, Bellevue-Stratford Hotel, Philadelphia, Pa.

February 15-16—Pennsylvania Electric Association, System Planning Committee, Hotel Pittsburgh-Hilton, Pittsburgh, Pa.

March 6-9—American Society of Mechanical Engineers, Fifth Gas Turbine Conference, Hotel Rice, Houston, Tex.

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March 14-18—National Association of Corrosion Engineers, 16th Annual Conference and 1960 Corrosion Show, Dallas, Tex.

March 21-23—Southeastern Electric Exchange, Annual Conference, Boca Raton Hotel, Boca Raton, Fla.

March 21-23—National Electrical Manufacturers Association, First National Electric House Heating Exposition, Hotel Sherman, Chicago, Ill.

March 27-29—Southwest Electric Conference, Chandler, Ariz.

March 28-29—Pacific Coast Electric Association, Engineering and Operation Conference, San Francisco, Cal.

March 29-31—22nd Annual American Power Conference, Hotel Sherman, Chicago, Ill.

April 3-8—Engineers Joint Council, Nuclear Congress, Coliseum, New York, N. Y.

April 7-8—Southeastern Electric Exchange, Engineering and Operation Section Conference, Roosevelt Hotel, New Orleans, La.

April 20-22—Missouri Valley Electric Association, Engineering Conference, President Hotel, Kansas City, Mo.

April 27-29—Northwest Electric Light and Power Association, Engineering Conference, Hotel Florence, Missoula, Mont.

April 28-29—Pennsylvania Electric Association, Systems Operation Committee, Bedford Springs Hotel, Bedford, Pa.